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CENSUS AND RESERVATIONS OF THE KWAKIUTL NATION.

BY

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(*With map.*)

The Indian tribes of the coast of British Columbia are divided into a great number of bands, each of which is subdivided into gentes. Every one of these gentes claims certain tracts of land as its property, which, according to their traditions, was given to their ancestor by the deity. This fact has made the work of allotting reserves to the single tribes somewhat difficult, as wherever these ideas of the natives were disregarded, dissatisfaction was the result. In selecting the sites of the reserves, care has been taken by the Canadian government to meet the wishes of the Indians, particularly to reserve their salmon streams, village sites, and burial-grounds. Therefore their opportunities of procuring food are not diminished, for hunting on the mountains and fishing in the sea are free. The claims of the single gentes to separate fishing grounds, districts for gathering berries and for hunting,

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are disregarded by the government, each reserve being the property of the whole tribe.

Following is a list of the reserves allotted to the tribes of the Kwakiutl nation in 1882, 1885, and 1886. The situations of the single reserves will be found in the accompanying map:

Quaw-she-lah (Kwasila), Smith Inlet.

1. Wy-cless (Waitlas), 300 acres; the village of the Kwasila, situated at the mouth of Samo River.
2. Ne-kite, 170 acres; a valuable salmon fishery.

Nah-keoock-to (Nakwartoq), Seymour Inlet.

The reserves of this tribe were marked off in 1882, but as the tribe had resolved in a general assembly not to make known the sites of the salmon streams, only a reserve for their village could be determined.

1. Ke-ques-ta (Kikwistoq), 150 acres; the village of Nakwartoq.
2. A small island in Nugent Sound, about one quarter of a mile south of the village. A number of graves are on the island.

Nahwitti Indians.

Two tribes are comprised under this name: the Naqomqilis of C. Scott, and the Tlatlasiqoala of Hope Island. At the present time both tribes live together in the village H'umtaspe on Hope Island.

1. Hope Island, 9,225 acres; originally belonging to the Tlatlasiqoala.
2. Se-mach, 6 acres; a favorite camping ground when the natives go halibut fishing.

3. Ouch-tum, 12 acres.

4. Nah-witti (Nauéte), 18 acres; site of an old village and fishing station; 2–4 originally belonging to the Naqomqilis.

5. Glen-gla-ouch (Tlentlauq ?), 14 acres; a fishing station, originally belonging to the Tlatlasiqoala.

Fort Rupert Indians.

Four tribes are comprised under this name: the Kwakiutl, Walaskwakiutl, Kuéh'a, and Komkiutis. Among them the Kwakiutl are the most important.

1. Tsáh'is (Fort Rupert), 4¼ acres; village of the tribes.
2. A reserve of 33 acres.
3. Q'āmsih'tle (Shell Island), ½ acre.
4. Tsul-qua-te (Tsęlh'ot), 68 acres; a salmon fishery.
5. Thomas Point, 45 acres.
6. Keogh (Kyoky = house), 6 acres; a small camping ground and fishing station.
7. Klick-see-wy (Tliksiuae), 147 acres; an important fishing station.

Nimkeesh Indians (Nimkish).

1. Alert Bay (Ilis), 50 acres; the village of the tribe.
2. Burial-ground, 2 acres.
3. Ttes-la-kee (Tseslaki), 335 acres; salmon fishery.
4. Otsaw-las (Otsales), 50 acres; salmon fishery.
5. Arse-ce-wy-ee (Asisiwae), 42 acres; salmon fishery.

Village Island Indians (Mamaleleqala and Kwiksot'enoq).

1. Mah-ma-lilli-kullah, 333 acres; village of the tribes. The proper name of the locality is Mēmkumlis.
2. Mee-tup, 18 acres; salmon stream.

3. Ah-ta, 27 acres; fishing station.

4. Kaw-we-ken (Kak-we-ken), 12 acres; fishing station.

5. A reserve of 65 acres at Dead Point, inhabited by an Indian family.

It is somewhat doubtful to which tribes these reserves originally belonged. The Indians affirm that the mouth of Knight Inlet and the neighboring countries belong to the Mamaleleqala, while the western part of Gilford Island and the outlying islands were the territory of the Kwiksot'enoq [or Tsawat'enoq ?].

Gilford Island Indians.

This group comprises the Tsawat'enoq, Kwauaenoq, and H'ah'uámis.

1. Qua-ya-stums (Qoaiastems), 38 acres; the winter village of these tribes.

2. Kunstamis, 15 acres; fishing and camping station.

3. Keogh (Kyoky), 16 acres; salmon fishery.

4. Quay (Qoaē), 10 acres; fishing and hunting station.

5. La-wauth (Lawatl), 13 acres; fishing station.

6. Gley-ka (Tleika), 9 acres; salmon fishery.

7. Qua-ee (Qoaē), 350 acres. This district is one of the principal stations for the olachen fishery. The reserve is visited by fourteen tribes of the Kwakiutl nation inhabiting the adjoining country.

8. Al-al-co, 306 acres; olachen and salmon fishery.

9. Graveyard, 3½ acres.

It is probable that No. 1 does not belong to the former territory of these tribes, but to that of the Kwiksot'enoq; 2, 3, 4, and 5 are situated in the country of the Kwauaenoq; 7, in that of the Tsawat'enoq; and 8 and 9 belonged originally to the H'ah'uámis.

Knight Inlet Indians (*Tenah'tah' and Ah'wah'kitlala*).

1. Tsau-watti (Tsawéte), 410 acres; salmon and olachen fishery.

2. Keogh (Kyoky), 106 acres; salmon fishery.

3. Kwat-se (Qoatse), 52 acres; winter village of the tribes.

4. Burial ground, 3 acres.

Knight Inlet is the most productive olachen fishery, and for this reason it is visited by all the tribes of the neighborhood who own parts of the village Tsawéte.

Turnour Island Indians (*Tlautisis*).

1. Kar-luk-wees (Qalukwis), 25 acres; the village of the tribe. A small island, on which are a number of Indian graves, lying south of the village, belongs to the reserve.

Formerly the Tlauitsis lived in Hardy Bay, west of Ft. Rupert, while the Kwakiutl owned the island Qalukwis, opposite the reserve of the Tlauitsis. The Indians say that later on the Kwakiutl purchased or conquered Hardy Bay, and that the Tlauitsis migrated eastward and located on Turnour Island.

Mah-tulth-pe (*Matilpi*).

1. Et-se-kin, 16 acres; the winter village of this tribe.

2. A reserve of 26 acres; a favorite resort of this tribe, shellfish being found in great quantities on the shore.

3. Hay-lah-te, 44 acres; fishing and hunting station.

4. A reserve of 47 acres; salmon fishery.

Laich-kwil-tach Indians (*Lekwiltoq*).

The tribes which belong to this group speak a dialect slightly differing from the Kwakiutl. They consist of

five sub-tribes: The H'ah'amatses, Wiweq'ae, Wiweaqam, Kueh'a, and Tlaáluis.

1. H'usam, 325 acres; formerly the winter village of the H'ah'amatses, but at the present time only used as a salmon fishery.

2. Ho-may-no, 37 acres; a salmon fishery.

3. Loughboro', 40 acres; a fishery frequented during the fall and winter.

4. Mat-la-ten, 208 acres; the winter village of the Wiweaqam. Two small rocky islets, southeast of the village, on which are a number of Indian graves, are included in the reserve.

5. Ma-tsay-no, 128 acres; a valuable fishery and hunting ground.

6. Sa-ai-youck, 47 acres; a fishing station.

7. A fishing station of 10 acres.

8. A fishing station of 13 acres.

9. A reserve of 210 acres; is chiefly used by the Indians when working in the neighboring logging camps.

10. Cape Mudge, 946 acres; the winter village of the Wiweq'ae.

It is intended to make an eleventh reserve on Campbell River, but this has not yet been done.

It is impossible to separate these tribes, who, after numerous wars with their northern and southern neighbors, settled in the territory in which their reserves are situated. About one hundred and fifty years ago they occupied Vancouver Island as far as H'usam, Thurlow Island, and the northern part of Valdes Island. Their southern neighbors were the Comox, who at present live farther south, the Lekwiltoq having conquered their old home.

An agent for these tribes was appointed in 1881, but it was not until 1883 that the first census was published. The tribes are all distinguished, except the Tlatlasiqoala and Naqomqilis, who are joined in the name Nauéte. I do not know the tribe called Wawlitsum in this list, but it may be that it is identical with the Tlaáluis. I do not know in which tribe the Komkiutis of Ft. Rupert are incorporated.

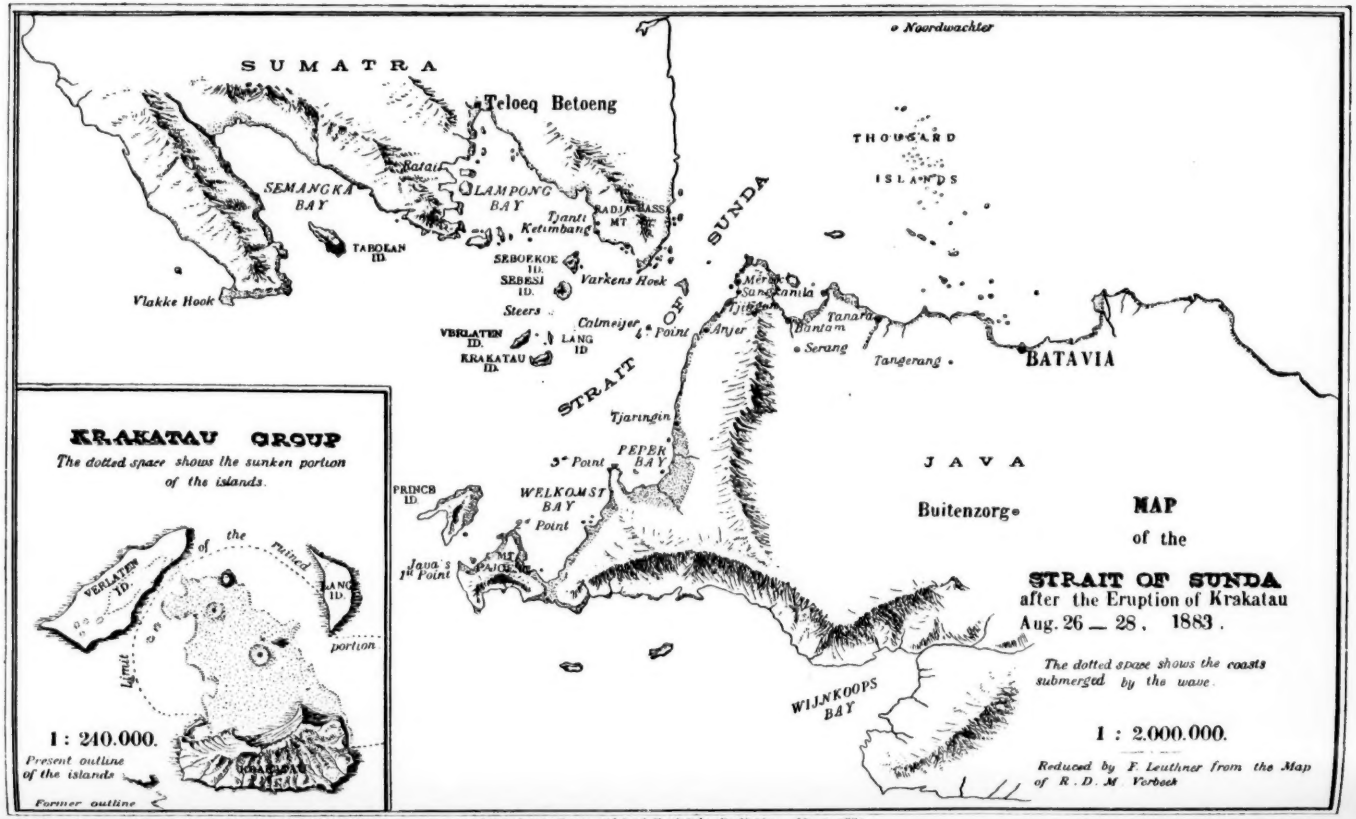
CENSUS OF THE TRIBES OF THE KWAKIUTL NATION.

	1883.	1884.	1885.
Tlaskenoq	12	8	14
Keop'enoq	18	14	20
Qosqimo	192	144	145
Kwats'enoq	40	33	34
Nauéte	108	91	101
Kwasila	47	45	47
Nakwartoq	167	146	124
Kwauaenoq	47	36	46
H'ah'uamis	86	68	69
Tsawat'enoq	164	132	148
Kwiksot'enoq	45	36	50
Mamaleleqala	188	160	165
Kwakiutl	83	60	65
Kueh'a	82	61	59
Walaskwakiutl	66	33	48
Nimkish	190	174	162
Tlauitsis	110	100	107
Tenah'tah'	112	116	120
Ah'wah'itlala	46	49	51
Matilpi	84	70	63
H'ah'amatses	42	35	32
Kueh'a	61	37	39
Wawlitsum	89	75	83
Wiweaqam	50	52	52
Wiweq'ae	135	114	125
	2,264	1,889	1,969

These figures show that the census is not very reliable. A sudden increase of a small community, as that of the Tlaskenoq between 1884 and 1885 from 8 to 14 is impossible. The season when the villages are visited by the agent is unfavorable for a census, many families

being absent fishing, and it is necessary to have a complete list of the inhabitants at hand in order to make reliable inquiries. In 1886 another agent was appointed, and therefore no census was made. It seems from the report that an abnormal number of deaths occurred in 1883, but the increase of 4.23 per cent. for one year in a people generally decreasing in number is very improbable. Remarkable is the increase of the Tenah'tah' and Ah'-wah'itlala.

The endeavors of missionaries and of the government to improve the condition of these natives, and to civilize them, have so far been futile. They cling with a remarkable tenacity to their customs and old mode of life. It has been and is attempted to induce them to till the soil, but they are averse to the occupation, and prefer fishing and hunting, which furnishes them with an ample stock of provisions. The land is not favorable to agriculture, and the few white settlers in this region, with one exception, are lumbermen and salmon packers. Therefore it seems that the attempt to introduce agriculture must fail. It is impossible to apply the same method of civilizing in all cases, and there can be no doubt that on the northwest coast of America agriculture is not the proper way of educating the natives. Their own industries and occupations suggest that an introduction of trades would be more successful. Carpentry and basketry would require little encouragement and instruction to give good results, and the original character of the Indian art-products would secure a great market. It seems to me that the development of methods of fishing and of trades would prove the most satisfactory method of civilizing these Indians.


SUMATRA
Teloeq Betoeng
Batavia
SEMANGKA BAY
LAMPONG BAY
Tjanti
Ketimbang
RADJABASSA MT
TABOLAN ID.
SEBOEKOE ID.
SEBESI ID.
Varkens Hook
Vlakke Hook
Steers
Calmeijer Point
VERLATEN ID.
LANG ID
KRAKATAU ID.
STRAIT OF SUNDA
Noordwachter
THOUSAND ISLANDS
Merak
Sangerania
Anjer
Tanara
Bantam
Serang
Tangerang
BATAVIA
Tjaringin
5te Point
PEPER BAY
PRINCE ID.
WELKOMST BAY
2de Point
Java's 1st Point
JAVA
Buitenzorg
WIJNKOOPS BAY
MAP
of the
STRAIT OF SUNDA
after the Eruption of Krakatau
Aug. 26 — 28, 1883.
The dotted space shows the coasts submerged by the wave.
1 : 2.000.000.
Reduced by F. Leuthner from the Map of R. D. M. Verbeek
KRAKATAU GROUP
The dotted space shows the sunken portion of the islands.
of the ruined
VERLATEN ID.
LANG ID.
portion
limit
1 : 240.000.
Present outline of the islands
Former outline

KRAKATAU.

A Narrative by GEORGE C. HURLBUT.

From the Study by R. D. M. VERBEEK.

The government of Netherlands India published, in 1885 and 1886, a work * by Mr. R. D. M. Verbeek, mining engineer, on the volcano of Krakatau and its eruption in 1883. The completeness of the work, with its maps and illustrations, does the greatest honor to Mr. Verbeek who wrote it, and to the liberal-minded government which has brought it out in a shape so admirable.

Krakatau is a volcanic island, situated almost in the middle of the Strait of Sunda, which separates the great islands of Sumatra and Java. It is recorded that an eruption of Krakatau occurred in 1680, but Mr. Verbeek concludes from the evidence that it must have been, in any case, but a slight convulsion. The volcano was regarded as extinct, and, with the exception of a field of bare lava at the northern extremity, the island was covered with luxuriant vegetation.

The Krakatau † group was composed of four islands: Krakatau, 5.6 miles in extreme length, by 3.11 in

* Krakatau, par R. D. M. Verbeek. Texte: 1ère partie, Batavia, 1885; 2de partie, Batavia, 1886. Album de 25 planches, Bruxelles. (12) Cartes, plans, etc., contenant 43 figures, Bruxelles.

† This is the correct form of the name according to usage in Netherlands India, but it seems to be a corruption of the native name Rakáta, and this, in turn, is not improbably a modification of the Sanskrit word Karkata, or Karkataka, *crab*, or *crawfish*. Mr. Verbeek, without deciding the question of origin, adopts the name Rakáta for the peak of Krakatau.

breadth, with an area of nearly 13 square miles, and an elevation of 2,697 feet; Verlaten (Desert) Island, lying N. W., and Lang (Long) Island, N. E. of Krakatau; and to the W. of Lang Island the islet called "De Poolsche Hoed" (the Polish Hat).

It was on Sunday, the 20th of May, 1883, that the people of Batavia, Buitenzorg, and the neighboring places, were surprised to hear, at between ten and eleven o'clock in the morning, a confused rumbling in the air, mingled with detonations like the discharges of cannon. These noises soon became so violent that great alarm was felt as to their origin, for they were clearly not caused by an earthquake. The sounds came from the direction of Krakatau, distant about ninety-five miles from Batavia and Buitenzorg,* but telegrams from Serang, Anjer, and Merak, places much nearer the Strait of Sunda, announced that neither the detonations nor the atmospheric vibrations had been remarked. On the 22d of May, when the noises, continued through two days, had reached their greatest intensity, the people of Batavia learned that the scene of the commotion was at Krakatau.

Reports soon came in from vessels which had passed through the Strait of Sunda.

The American ship *A. R. Thomas* had had her deck covered with ashes to the depth of an inch and a half, subterranean (?) noises had been heard, and clouds of smoke had been seen rising from Krakatau. From a native vessel anchored near the island, the northern crater of the mountain had been seen in eruption at ten o'clock

* These detonations are said to have been heard at Singapore, nearly 520 miles from the volcano. Buitenzorg, it is to be remembered, is 36 miles almost due S. from Batavia.

in the morning of the 20th, and again on the night of that day. The steamer *Zeeland*, which left Batavia on the 20th for the Netherlands, was near Krakatau at six P.M., the same day. At that hour there hung over the island a black cloud, incessantly furrowed by lightning, accompanied by a rattle like that of *mitrailleuses* in action; the flashes did not strike the land, but remained in the cloud. The needle of the compass oscillated constantly, with a deviation of 12°. There followed a dense shower of ashes and stones. There are two accounts of the observations made on board this vessel, and from one of them Mr. Verbeek quotes, with equal malice and delicacy (for he suppresses the name of the writer), the surprising statement that around Krakatau the waters rose to the heaven. This phenomenon Mr. Verbeek supposes to have been an optical illusion, because it was nearly night at the time, and also because the other account says nothing of the wonder.

On board the *Soenda*, which was near the island on the evening of May 22d, the activity of the volcano was observed. Dr. Sulzer, the medical officer, saw the flashes of lightning in the upper cloud converge towards the column of smoke, that rose above the crater, opposite to Verlaten Island; but there was no disturbance of the compass. From the base of the smoky column issued, every few minutes, ten or fifteen fiery clusters, like sheaves of wheat in shape, and of a dull-red color. These were followed by loud reports which made the vessel tremble. At seven miles beyond Krakatau there fell for a half hour a heavy shower of ashes; three miles farther on, fragments of pumice were found floating, and south of the large island of Taboean, thirty miles from

Krakatau, the fragments formed a layer so thick that a bucket let down from the ship was brought up filled with pumice and with hardly a drop of water.

The same day, near nightfall, the steamer *Archer*, of the Queensland Royal Mail Line, fell in with this same bed of pumice-stone. For nearly seven hours, up to one o'clock P.M. on the 22d, the *Archer* had steamed through a shower of fine ashes, and those on board had noticed above Krakatau the dark cloud, seamed with the lightning flashes.

On the 23d of May the Netherlands packet *Conrad*, which had passed through a shower of ashes off Bencoolen (275 miles W. of Krakatau), encountered the bed of pumice-stone, and at seven P.M., when near the volcano, there was a dense shower of ashes, and the air was filled with sulphureous vapors. At some distance the black smoke was seen cut short off, as if stopped by a wall, by the eastern monsoon, while toward the west the ashes extended as far as the eye could reach. The temperature, while the ship was enveloped in the cloud of ashes, rose to 101°, and fell at once, when the clear air was reached, to 86°.

The German corvette *Elizabeth* left Anjer on the 20th of May, at nine o'clock in the morning, homeward bound. Shortly after those on board saw rising above Krakatau a white column of vapor enclosing dark clouds, which rose with it to the height, as measured by the officers, of 36,090 feet (11,000 metres). Soon after began to fall a shower of very fine yellowish-gray ashes, which penetrated everywhere and continued to fall till the night of the 21st–22d. On the morning of the 21st the daylight was pale, as if the sun were eclipsed; the heaven presented

the appearance of a dome of opaline glass, and the sun resembled a pale-blue globe. Another shower of ashes was encountered 345 miles from Krakatau.

Mr. Verbeek remarks that this account enables us to estimate, with some degree of probability, the height to which the matter ejected from the volcano in the eruption of August was thrown, and that it records the first observation of the blue sun, the sight of which caused so much surprise in September in British India, Ceylon, Paramaribo, and elsewhere.

The steamer *Gouverneur-Generaal Loudon* took down from Batavia, on the 26th of May, a number of visitors to the volcano, which was reached the next morning. One of the party, Mr. J. A. Schuurman, a mining engineer, says in his report: "The island was entirely bare and desolate. The dense vegetation had disappeared, and from the parched ground went up a smoke 'like the smoke of a furnace.' In the midst of this scene of complete destruction, rose, with indescribable splendor and with a noise like thunder, a mighty column of smoke, many metres broad at the base, and spreading and revolving as it rose to the height of 1,000 or 1,200 metres, and thence shooting up 2,000 or 3,000 metres still higher, growing paler as it mounted, and discharging its burden of ashes to be borne away by the east wind. Every five or ten minutes there was an explosion, preceded by a frightful noise at the base of the column, and then followed from a height of 200 metres a shower of stones."

Mr. Schuurman and a few others landed on the island, and climbed to the eastern wall of the crater. They looked down on a basin about 3,300 feet in diameter at the top, and narrowing 130 feet below to a diameter of

from 500 to 800 feet. The bottom was covered with a black and somewhat shiny crust, and through an opening in this issued the column of smoke. Nothing could be seen of melted lava. The matter thrown out was, for the most part, ashes and pumice-stone, with fragments of obsidian, of which the ashes were principally composed.

Mr. Verbeek himself, it should be noted, was in Europe during all this time, and did not return to Batavia till the 3d of July.

During the interval between the eruption of May and that of August, two other craters were formed on the island of Krakatau; but the total thickness of the matter deposited in the immediate vicinity of the volcano was but a foot and a half, or, according to Engineer Schuurman, a little over 3 feet.

On Sunday, the 26th of August, 1883, Mr. Verbeek, in his house at Buitenzorg, heard at one P.M. what he took to be the rolling of distant thunder. An hour and a half later the sound was interrupted by explosions, feeble at first, but rapidly growing louder and more violent, so that the house began to tremble with the vibration of the air. There was no earthquake, nor does there seem to have been any through the whole of the eruption, except possibly two insignificant shocks.

During the night of the 26–27th August the sounds became so formidable that hardly any one in Western Java was able to sleep. "No one," says Mr. Verbeek, "who has not gone through the experience can form an idea of the impression received when a mountain nearly 100 miles distant causes a concussion as terrible as that made by discharges of artillery close at hand. Add to this the noises of the house, the rattling and

clicking and jarring of the numberless movable articles, shaken to and fro, and the creaking of the doors and windows, and consider the effect of all these things on the nerves."

At a quarter before seven on Monday, the 27th, there was a report so tremendous that every one rushed out.

At Mr. Verbeek's house, and in three others, which, like his, faced the west, hanging lamps were thrown down, the plaster fell from the walls, and windows and doors were opened.

This was the most violent explosion felt at Buitenzorg. The rest of the day was comparatively quiet till seven o'clock in the evening, when the sounds began again, and continued to increase in violence up to about eleven P.M. Before three o'clock A.M. on Tuesday they had completely ceased.

After the explosion at 6:45 A.M., on Monday, the sky was clear, but for a slight cloudiness in the west, which gradually deepened and increased until at 10:15 A.M., it was necessary to light the lamps and the lanterns of the vehicles.

The whole heaven was at this time of a livid yellowish tint.

Half an hour later the ashes began to fall heavily and continued to one P.M.; then more lightly till three o'clock.

The grains, small and round, were of a clear gray, very moist, and easily crushed between the fingers into a floury powder.

After three o'clock P.M. the air was filled with a cold fog that smelled slightly of sulphuric acid.

During the darkness, and after it had passed, the air was sensibly colder than on other days; and although the

obscurity was not entire at Buitenzorg, it was so dark at mid-day that trees and houses, 70 or 80 feet away, could not be made out.

After 1 o'clock P.M., the light increased and the cocks began to crow.

The night had been an anxious one at Batavia, and many of the inhabitants, not daring to go to bed, had passed the hours in walking about the Koningsplein.

The most violent explosion was heard at 8:20 or 8:30 A.M. on the 27th; for the accounts differ. Many buildings were cracked by the force of this explosion. Darkness came on between ten and eleven A.M., and at eleven ashes began to fall. It was almost like night till noon, when the day began to brighten, and at two P.M. the ashes had ceased falling. The temperature was nearly 13° lower at mid-day than on the day before or the day after.

A little after mid-day the waters rose suddenly at Batavia and inundated a portion of the lower city up to the fish-market. Twenty minutes later another wave came in with great force and within a half-hour retreated, so that the channel was left almost dry; vessels and boats were stranded, and the Chinese and natives caught fish in quantities by the hand.

Between mid-day on the 27th and midnight on the 28th there were eighteen of these waves.

The islands in the bay suffered a great deal of damage, and at Tangerang, in the western part of the Batavia Residence, 2,300 persons, natives, Chinese, and other Orientals lost their lives.

At Serang (about 40 miles E. of Krakatau) the noises began to be heard at three P.M. on the 26th. Through the night there was a smell of sulphur in the air, thunder

and lightning were noticed in the direction of the volcano, and some ashes fell. The next day it began to be dark at 10:30 A.M. and at eleven it was impossible to distinguish objects close at hand. About the same time fragments of pumice-stone began to be mingled with the ashes which had been falling since the early morning, and these were followed by a shower of mud, or wet ashes, which broke down the leaves and branches of the trees. This shower ceased at mid-day, but dry ashes continued to fall till eleven P.M. There was no noise, but instead of it a silence so oppressive that few persons could bear it calmly, and the domestic animals, seeking the protection of the light and the companionship of man, were not to be driven away even by force. Twilight began to appear at four o'clock in the afternoon.

In Bantam, at the W. extremity of Java, the destruction caused by the waves was very great; but the only places in which Europeans were to be found, Merak, Anjer, and Tjarinjin, were completely ruined, and very few of the Europeans escaped, so that details of the catastrophe in this direction are more or less wanting.

At Merak the only European left alive was E. Pechler, accountant of the harbor of Batavia. He was on his way to send a telegram with news of the ruin caused in the lower part of Merang. He was at the foot of the great hill behind Merang when the wave came in, a little after nine o'clock in the morning. He rushed up the hill, but the waters overtook him and had reached his knees when he fainted; nor did he regain consciousness till early the next day. Mr. Verbeek believes that the wave did not come in at Merak until after ten A.M., and he gives the evidence of Mr. Abell who reached Sangkanila, not far

from Merak and very near the sea, at ten o'clock the same day. Five minutes after his arrival Mr. Abell saw, all at once, rolling in, "a colossal wave as high, it seemed, as a cocoa palm."

He and his companion saved themselves on the hill, and, looking back, saw the whole coast covered. Within a few minutes after complete darkness set in, and for four hours there fell a violent shower of ashes and mud. At 2:30 P.M. the sky grew clear. Out of about 300 persons in the place but 3 escaped; and when the Engineer Nieuwenhuys arrived on the spot, on the 28th, the workshops and houses, and even the engineer's dwelling, which stood 45 feet above the level of the sea, had entirely disappeared. The cement pavement was the only sign left of the engineer's house. A locomotive was found, all crooked and twisted, 1,600 feet from the place where it had stood; and the iron rails of the road were torn from the sleepers and knotted together like so many ribbons. But one body was found, though a few were afterwards thrown on shore.

The water rose at Merak to more than 90 feet, and the whole low coast to the S. was also swept and ravaged up to the hills.

At Anjer the noise of the volcano began to be heard in the afternoon, and in the night there was a light fall of ashes, but no damage was done till 6.30 A.M. on the 27th, when a wave destroyed at once nearly the whole town. Some few Europeans escaped and fled to Tjilegon, ten miles away. A second wave followed an hour after the first. About ten o'clock a tremendous explosion was heard, accompanied by lightning and a heavy shower of ashes; then, in succession, four explosions and a fall of mud.

A third great wave carried away every thing that had been spared by the first two. Enormous blocks of coral were thrown upon the shore, the largest, which was found near the site of the light-house, containing nearly 10,500 cubic feet.

All the villages between Java's Fourth Point and Tjarinjin were destroyed, with Tjarinjin itself. Some of the houses in this last place had been thrown down on the 26th. About ten o'clock A.M. on the 27th an explosion was heard from Krakatau, and almost immediately after rolled in an enormous wave, which carried every thing before it.

East of the village of Bantam, as far as Tanara, the destruction was very great, the waves having penetrated from a mile to a mile and a half inland; and very many lives were lost. The water does not appear to have risen more than ten feet, but the force of the wave was extraordinarily great.

On the Sumatra side of the strait the devastation was not less terrible. Sumatra ends on the S. in three great points or capes: Vlakke Hoek on the west and Varkenshoek on the east; the middle point having no distinctive name. These three capes enclose two bays, the eastern one known as Lampong Bay, and the western called Semangka Bay. The great wave from Krakatau inundated from Vlakke Hoek to Varkenshoek the shores of both bays, and swept off many of the villages situated in the lower places.

At Ketimbang the Supervisor Beyerinck had a terrible experience, which he related to Mr. Verbeek. The unusual agitation of the water in the evening of the 26th caused great alarm at Tjanti, where Mr. Beyerinck was

with his wife and three children. About ten P.M. the waters came up to the out-houses of the property, and the Supervisor removed his family to a small settlement on the hill of Radja Bassa, at some distance inland. A servant, left behind in the house, joined the family in the night, reporting that the dwelling had been carried away at about two A.M. At six A.M. on the 27th, some natives sent to reconnoitre returned with the intelligence that Ketimbang had wholly disappeared.

All through the night small stones and ashes had been falling. There were continual explosions, and early on the 27th the smell of sulphur became perceptible. The detonations from the volcano grew louder towards ten A.M., and the sky became darker. At noon it was like night, and burning ashes fell for a short time, followed by a cold mud, which did not cease falling till the next morning; and the daylight did not reappear through the whole of Monday, the 27th. The youngest child died from the exposure, and for five days this family, with a crowd of natives who had also sought a place of safety on the hill, remained without shelter or help.

All were suffering more or less from burns occasioned by the hot ashes. It was not till the 1st of September that they were rescued.

Later reports showed that the whole district from Varkenshoek to Teloeq Betoeng, at the head of Lampong Bay, had been swept by a wave 79 feet in height, and that in Ketimbang alone, 4,900 persons had perished. At Teloeq Betoeng nothing was left standing but the Residence, the fort, the prison, and the cemetery. The waters stopped at about 100 feet from the Residence. At this place also, the first great wave came in at about 6:30 A.M.,

on the 27th. The pier, with the beacon, was partly destroyed, and the steamer *Barouw* was lifted completely over the pier and deposited in the Chinese quarter of the town.

The rain of ashes fell constantly, and there was incessant lightning in the direction of Krakatau, while the sky was like copper.

Between nine and ten o'clock there came a terrific explosion, accompanied by a great light, besides the continual flashes from Krakatau. Deeper darkness succeeded—"blacker," it was said, "than the blackest night"; the very phrase employed by Pliny the Younger, in his account of the eruption that overwhelmed Pompeii. Then there rose a violent wind, which shattered trees and branches, and dashed the falling mud against the doors and windows of the Residence, crowded with fugitives. The roaring of the tempest drowned nearly every other sound, though some persons in the building thought they heard the waves beating furiously against the hill.

On the morning of the 28th, the extent of the ruin became visible.

The whole plain was covered with fragments of dwellings, and ships, and storehouses, trunks of trees, and bodies of men and of animals.

Not a tree nor a house was left standing. The steamer *Barouw* had disappeared, but was found later in the valley of the Koeripan River, a mile and a half from the place in the Chinese quarter to which it had first been carried. One vessel, the *Marie*, a salt transport, was seen, to the general amazement, floating quietly in deep water.

Lampong Bay was so choked up by masses of pumice-stone that for several months merchandise from Batavia had to be sent by land from the outer coast.

At Teloeq Betoeng 3 Europeans and 2,260 Orientals lost their lives.

The devastation was almost equally great in Semangka Bay.

According to the report of the Supervisor Le Sueur, all the settlements along the shore, on the eastern as well as on the western side of the bay, as far as Vlakke Hoek, were destroyed, some partially, but most of them entirely. The islands Sebesi and Seboekoe, lying 20 miles to the N. of Krakatau, were swept clean. Of the 3,150 inhabitants, not a soul escaped.

The island of Noordwachter, about 60 miles N. E. of the N. entrance to the Strait of Sunda, was submerged, and the Duizend Eilanden, midway between Noordwachter and the Java coast, were inundated, and most of the houses were swept away. The great wave was felt for some distance along the eastern coast of Sumatra, and on the southern and western sides of the island of Billiton; but it was not remarked in Borneo or Celebes, nor in the other islands of the archipelago.

The noise of the eruption, however, was distinctly heard through the whole archipelago.

Ten vessels were in the Strait of Sunda, or in the neighborhood, during the eruption.

Captain Thompson, of the *Medea*, heard the first explosion at two P.M., on the 26th of August; then several others, at intervals of 10 minutes. The first was followed by the rising of a column of smoke from the mountain to the height of 17 miles. A second measurement, made 3 hours later, gave 21 miles.

These are the only calculations of which Mr. Verbeek has information with regard to the height of the column during the eruption of August.

The American ship *W. H. Besse*, Captain Baker, entered the strait, homeward-bound from Batavia, in the night of the 16th. Continual explosions were heard through the night. At daybreak, the ship being between Krakatau and Anjer, a very black cloud was seen to rise in the west, and spread over the sky.

The captain cast anchor, and had all the sails furled. Immediately a squall struck the ship, and the starboard anchor was lost, with 80 fathoms of chain.

With the wind came a beating storm of ashes and sand, the darkness became impenetrable, and the sea was agitated in a frightful manner. There was a suffocating odor of sulphur, and the darkness was made more terrible by intensely vivid lightning.

Towards three o'clock in the afternoon the air cleared a little, though the rain of ashes continued.

One other vessel, the *Gouverneur-Generaal Loudon*, had an experience not less trying than that of the *W. H. Besse*. This vessel reached the road of Teloeq Betoeng at 7:25 P.M., on the 26th Aug. and made several efforts to communicate with the shore by boat; but the sea ran too high. There were signals of distress from the vessels in the roadstead, but it was impossible to give them any help. At 7 A.M. on the 27th four great waves in succession swept the coast. The beacon went down and the steamer *Barouw*, and some smaller vessels were carried inland before the eyes of those on the *Loudon*. Commander Lindeman made haste to leave the roadstead, intending to return to Anjer, but the increasing fall of ashes and pumice and the growing darkness forced him to cast anchor in 15 fathoms of water, near the islet of Tegal, 10 miles from Teloeq Betoeng.

The hours that followed were terrible. At half past

10 there was complete darkness, accompanied by a heavy fall of ashes and mud, with thunder and lightning, and a wind that rose almost to a hurricane, and swept the decks clear of every article not solidly fastened down.

The bluish St. Elmo fires burned on the masts and yards, and immense seas tossed the steamer about, so that her commander feared she would founder; and in order to prevent her breaking adrift, he kept her in motion between the two anchors. At 1 P.M. the tempest subsided, but the obscurity lasted through the whole day, and it was not till 4 A.M. on Tuesday, the 28th, that the vessel was able to proceed on her way.

At the mouth of Lampong Bay, it was found that Seboekoe and Tiga islands were united to the mainland of Sumatra, and Commander Lindeman determined to pass round by Lagoendi Strait and S. of Krakatau. On issuing from Lagoendi Strait, he found himself in a vast field of floating pumice, not less than 6 feet thick in the middle. After working through this he reached open water and at 4 P.M. arrived at Anjer, which he recognized by the lower portion, still standing, of the lighthouse on Java's Fourth Point. Every other building, without exception, had vanished.

The other ships do not seem to have been at any one time in very great danger.

According to the official documents, tabulated by Mr. Verbeek, there perished in the catastrophe of Krakatau 36,417 persons, 37 of them Europeans.

The distances at which the noises of this eruption were heard surpass any thing previously known. The four strongest explosions occurred on the 7th of August at the following hours, A.M.: 5:30, 6:44, 10:2, and 10:52, Krakatau

time. Nearly all the observers supposed that the sounds proceeded from a locality much nearer to them than Krakatau. To some they seemed like the noises of a volcano; to others, like discharges of cannon, and still others conceived them so clearly to be signals of distress from ships in danger that in several places steamers were dispatched to render assistance.

The reports were heard not only in every island of the Archipelago, including the Philippines, where at Manila cannon were fired to answer the signals, and preparations were made to rescue the ship in distress, but in Cochin-China, at Bangkok, and 100 miles in the interior of Siam, at Singapore and Penang, in the Nicobar and Andaman Islands, in British Burmah, at five places in Ceylon, at Keeling Island, and at eight places in Australia.

Taking Krakatau as a centre, the sounds were propagated in a circle, with a diameter of 4,142 miles, and the area enclosed within this circle is equal to one fifteenth of the earth's surface.

The air-waves, produced by the explosions, were marked at very many points on land and sea by disturbances of the barometer; and the great air-wave, revolving round Krakatau as a pole, made three times the circuit of the globe.

The very fine ashes, carried into the upper regions of the air, were beyond doubt the cause of the blue sun already mentioned.

Mr. Verbeek has found, by a study of the reports received, that it was not till some time after the eruption that the strange appearance of the sun was noticed. The first positive date of observation is the 30th of August, at Yokohama, where, a little after mid-day, the light of

the sun grew pale, and a yellowish gray vapor spread over the sky. Two hours before sunset the sun looked like a full moon surrounded by a crown of pale light. At Tokio, during the last two or three days of August, the sun was of a copper color. At Cape Coast Castle, and at several places in Venezuela and Colombia, as well as at Port of Spain, Trinidad, and Paramaribo, the sun was blue, on the 2d of September. At Carthagena and at Panama, on the same day, the color of the sun was green, while in the Sandwich Islands, and at several points in the Pacific Ocean, from the 3d to the 7th of September, it appeared to be red or of a copper hue. On the *Zealandia*, three days after leaving Honolulu for Sydney, the sun was seen to be blue on the 5th and 6th of September; and on the *Jennie Walker*, in 155° 28′ W. lon., and 8° 20′ N. lat., on the 4th of September, the sun shone green, at five P.M.

In Ceylon and Southern India the blue and bluish-green suns were seen from the 9th to the 14th September, and again from the 22d to the 24th of the same month.

The splendid sunsets, caused, like the strange appearance of the sun, by the suspension in the atmosphere of the fine dust from the volcano, were first observed in the latter part of September, and lasted into the year 1884. Mr. Verbeek is well aware that this explanation of the brilliant sunsets is not universally accepted, but he holds it to be practically established.

The ocean wave, produced by the eruption, was not less wonderful than the atmospheric disturbance.

This wave was registered throughout the East Indies, on the African and Australian coasts, at Moltkehafen in South Georgia, at Orange Bay (Cape Horn), at Talcahuano in Chile, at Auckland and Wellington in New

Zealand, at Saucelito in the Bay of San Francisco, at Kadiak in Alaska, and on the W. coast of France, near Rochefort.

It reached Moltkehafen, which is 6,685 nautical miles distant from Krakatau, in 13 hours and 50 minutes, and travelled, therefore, at the rate of 483.2 nautical miles an hour. This was its greatest rate of speed, the average of the records showing 375 nautical miles an hour.

Considering the formidable character of the eruption, the permanent changes effected by it were surprisingly small.

There has not been discovered the slightest trace of upheaval, whether of the bottom of the sea or of the coast. In Bantam and the Lampong districts, after the devastation, the undestroyed portions of the gravelled roads along the shore were found everywhere to be at the same height above the level of the sea as before. The soundings made in the Strait of Sunda have proved that for some distance from Krakatau the bottom of the sea has suffered no change of level, and that the diminished depth of water in the neighborhood of Krakatau and between it and Sebesi ought, probably, to be attributed to the accumulation of matter thrown out by the volcano. Mr. Verbeek made very careful search in the newly formed islands of Calmeyer and Steers for signs of a crater or of coherent lava, but could find no indication that the activity of the volcano had manifested itself outside of Krakatau. The new islands are formed of ashes, sand, and small fragments of pumice-stone, all in horizontal layers. They are, therefore, merely the most elevated portions of a great mass of erupted matter which extends to the west and south in a kind of belt around Krakatau. On Calmeyer there are funnel-shaped wells

formed by the sinking in of the ashes which fell in a moist condition. The bottom of these pits is generally on a level with the sea, and some are situated along a right line in such a way that new subsidences establish a crevasse, which the action of the water enlarges and deepens. There is no doubt that both islands will soon have disappeared, and that the portion of the bank covered by the water will also be carried away, since the entire mass is probably composed of loose materials. In this way the sea between Sebesi and Krakatau will regain its former depth and become once more fit for navigation. Mr. Verbeek made a second and a third visit to Krakatau in August and September, 1884, and found Steers Island in the state of a very low sandbank on which the sea was breaking. Nothing was visible of Calmeyer, although the steamer passed to the south and very near the spot where the island had been.

The northern part of Krakatau, extending from the the Peak nearly to Verlaten Island, and including the craters of Perboewatan and Danan, as well as the northern portion of the Peak itself, has completely disappeared. In the place which this part of the island formerly occupied there is now a deep sea, where the lead sinks to 330, 650, and, in some places, to 1,000 feet; and the commander of the *Hydrograaf* reports that he found places where a line 1,200 feet long did not touch bottom.

Outside of this sunken portion, and between the three islands of Krakatau, Verlaten Island, and Lang Island, depths are found on the west of 470, 565, and 820 feet, and on the north there is a depth of 350 feet; so that there has been a subsidence not only of part of Krakatau, but of the neighboring sea-bottom.

The sea has deepened also to the east of Krakatau as well as between the islands. The depth on this eastern side, formerly from 165 to 230 feet, is now about 100 feet greater.

The centre of the nearly circular portion which has gone down is very close to the spot formerly occupied by the crater of Danan, which may, therefore, be taken to have been the principal seat of action.

The break seems to have occurred immediately at the most elevated point of Krakatau, and this has remained in its place. Mr. Verbeek's measurement gives the Peak a height of 2,730 feet; 33 feet more, that is, than the altitude set down on the chart, which Mr. Verbeek believes to be in error.

With the northern part of Krakatau disappeared also the islet of Poolsche Hoed.

The activity of the volcano did not end with the 28th August, 1883. Occasional detonations were heard in September and October, and on the 10th of the latter month a wave of uncommon force and magnitude rushed in at Welkomst Bay, on the Java side of the strait.

During the same month unusual displays of lightning were remarked, accompanied by muffled sounds as of explosions.

There was a renewal of these symptoms near the end of February, 1884, for two or three days, and with the notice of these ceases the record of this memorable eruption.

THE FALKLAND ISLANDS.

BY

GEO. C. HURLBUT.

The *Instituto Geográfico Argentino* published in 1886 the first part, containing six maps, of an atlas of the Argentine Republic, constructed by Dr. Arturo Seelstrang, a member of the institute, and brought out under the auspices of the Government. The maps are well drawn and lithographed, and the work on them seems to have been done with thoroughness. One extraordinary blunder, repeated seven or eight times, must not be overlooked. The word *Sonda* (the English *Sound*) is printed *Zonda*, a form not to be found in any European tongue.

A special interest attaches to this atlas, because it has been the occasion of much discussion between the Argentine minister for foreign affairs and the British envoy at Buenos Aires, the Hon. Edmund John Monson.

While the atlas was yet in preparation, Mr. Monson wrote, on the 15th of Dec., 1884, to the Argentine minister to protest against the inclusion in the forthcoming work of the Falkland Islands as part of the Argentine territory; some journals of Buenos Aires having stated that these islands would find their place on the map. Mr. F. J. Ortiz, the Argentine foreign minister, replied that the atlas was not the work of the Government, which could not in any case be held responsible for the utterances of journals.

There ensued a lively correspondence continued up to May, 1885, and dispassionate readers must admit that the advantage remained throughout with the Argentine minister.* He was supported, no doubt, by the justice of his cause, but not every righteous cause is adequately upheld by its defender. One phrase in his second letter is worthy of remembrance: "Your Excellency should bear in mind that a map neither gives nor takes away rights, and that those of England or the Argentine Republic in this case are not to be settled by tinting the islands blue or red on the map." The map has come out with the Falkland Islands (Islas Malvinas) in their place as part of the Argentine Republic.

The history of the group is soon told. It is composed of about 200 islands and islets, lying between Lat. 51° and 53° S., and Lon. 57° and 62° W. from Greenwich. There are but two islands of any considerable size, and these are called East and West Falkland (or Malvina), the eastern one being the larger.

The English navigator John Davis discovered, but did not take possession of, the islands in 1592; and by the common consent of nations mere discovery does not confer sovereignty. For nearly 100 years after, nothing was done. In 1690, Capt. Strong sailed through and gave the name of Falkland Sound to the passage between the two large islands; but it was not till 1764 that an attempt at colonization was made by the French under de Bougainville, who founded on the eastern island the town of Port Louis, and bestowed upon the group the name it bears in French and Spanish geography.

The relations between France and Spain were friendly,

* See "Boletin del Inst. Geog. Argentino," Tomo VI. Cuad IX.

but the Spanish Government objected to the presence of the French in the islands, and paid de Bougainville for his acquired rights in the settlement. This matter was not entirely disposed of when Capt. McBride, of Commodore Byron's expedition, landed in 1766 and took possession of Port Egmont (Cruzada, of the Spaniards) in the western island. This was an open defiance of the French authority, actually present at the time. The Spaniards took the place of the French in 1767, and received soon after a notification, by a vessel sent from Port Egmont, to the effect that the islands belonged to the crown of Great Britain. The answer was sent back that the English would do well to withdraw, since it was "contrary to the respect due to treaties to enter into those islands without the express permission of his Catholic Majesty." No attention was paid to this notice, and in June, 1770, an expedition, sent by the governor of Buenos Aires, expelled the English. There followed discussion between the two governments, and preparations on both sides for war. An arrangement was, however, finally made. The Spaniards agreed to restore the settlement at Port Egmont, in order to save the English honor, but made at the same time the following distinct reservation of their own supreme rights:

"The Prince of Maserano declares at the same time, in the name of his lord the King, that the promise given by his said Catholic Majesty to restore to his Britannic Majesty the possession of the fortification and port of Egmont in nowise prejudices the anterior right of sovereignty over the Malvinas, otherwise called the Falkland Islands."

This declaration was accepted by England, and Port Egmont was reoccupied by her forces in 1771. In 1774

these were withdrawn voluntarily, and the colony was abandoned, *after notice given to the Spanish Government.* On the 9th of April, in that year, the Spanish minister, Don Julian de Arriaga, wrote to the governor of Buenos Aires: "The Court of London having made offers to abandon the establishment formed by the English in the Great Malvina, and to withdraw from it the few troops and inhabitants that are there, the King wishes you to be informed of the details of this transaction, so that you may be able to observe with vigilance and attention whether the English do, in fact, abandon the said establishment, without attempting to form a new one in the immediate neighborhood; and that, after having assured yourself that they have complied with the terms agreed upon, you shall from time to time renew your exertions so as to be certain that they do not return to these places; keeping me informed with the greatest exactness of every thing that happens with regard to this matter or to any other."

This ought to be sufficiently clear. It is made still clearer by the fourth article of the treaty signed by England and Spain, Nov. 22, 1790. This article stipulates that British subjects shall not navigate nor fish in the Pacific Ocean or in the seas of the South (en el Océano Pacifico ó en los mares del Sur) within ten marine leagues of any one of the coasts already occupied by Spain.

The cost of administration in the islands ($150,000 a year) was supplied for the most part from the revenues of the province of Buenos Aires, and the official communications of the Spanish Government concerning the island dependency were directed always to the governor of that province.

In 1806, the year after Trafalgar, an English army of 10,000 men, under General Whitelocke, invaded Buenos Aires, and took the capital, but was shortly after defeated, and forced to surrender; and it was not till 1810 that Spain, in the stress of the war with Napoleon and confronted by the revolt of her American colonies, withdrew her forces from the Falkland Islands.

For ten years, from 1810 to 1820, there was no government authority present in the islands. During this period English and American seal-fishers frequented the group; but in 1820 the government of the United Provinces of the La Plata reassumed dominion, as the rightful representative of Spain, and in 1823 a fishing and stock-raising colony was authorized in the eastern island. Mr. Vernet, to whom this concession was made, asked and obtained in 1828 an extension of his privilege in order to support him against the foreign seal-fishers, who paid no regard to his rights, and on the 10th of June, 1829, the Government issued the following decree, with a preamble:

"Article First.—The Malvinas and the islands adjacent to Cape Horn, in the Atlantic Ocean, shall be administered by a political and military commander, appointed directly by the Government of the Republic.

"Article Second.—The residence of the political and military commander shall be in the island of La Soledad, and there shall be established there a battery under the flag of the Republic.

"Article Third.—The political and military commander shall cause to be observed by the population of the said islands the laws of the Republic, and shall be held responsible for the carrying out of the regulations concerning the seal-fishery (pesca de anfibios)."

The British chargé at Buenos Aires, Mr. Woodbine Parish, lodged with the Government on the 19th of November, of the same year, a protest against this decree.

Mr. Vernet, the year after, supported by the Government, seized and sent to Buenos Aires three American schooners, which had continued to capture seals after having been notified of the prohibition. The American Government sent a special commissioner to Buenos Aires to settle the affair; but while the discussion was going on the corvette *Lexington*, on the 31st December, 1831, attacked and destroyed the colony at La Soledad. This act, which has not yet been justified or atoned for, singularly complicated the situation.

In the autumn of 1832 the Buenos Aires government sent an armed vessel to La Soledad; but on the 5th of January, 1833, this vessel was driven off, and the islands were forcibly occupied by Captain Onslow, of the British corvette *Clio*.

On the 16th of January the minister of foreign affairs at Buenos Aires wrote to the British chargé to demand an explanation of Captain Onslow's action. The reply, clearly not modelled on the despatches sent from London to Paris, or Berlin, or St. Petersburg, was to this effect: "That he (the chargé) had received no instructions from his Government to make any communication on the subject to the Government of Buenos Aires."

The Falkland Islands have ever since remained in the hands of England; but the people of Buenos Aires and the Argentine Republic have never acquiesced, even for a day, in the usurpation of their rights, and Americans ought not to forget that this seizure, in time of peace, of territory belonging to an American republic, took

place eight years after the declaration of the Monroe Doctrine.

It is even more interesting to note that hardly six years before laying violent hands on these islands, England announced to the admiring nations through the mouth of her secretary for foreign affairs, the Rt. Hon. George Canning, that in recognizing the independence of the revolted Spanish colonies, she had called a "New World into existence to redress the balance of the Old."

It would not be easy to combine in a more effective way the lofty sentiment of Don Quixote with the practice of Dick Turpin.

An atlas of the Argentine Republic without the Falkland Islands would be like an atlas of the United Kingdom without the Orkneys.

A RECONNOISSANCE OF THE GREENLAND INLAND ICE.

R. E. PEARY, Civil Engineer, U. S. Navy.

From the year 1728, when the commandant of a proposed fort on the east coast attempted to ride across Greenland, and was turned back almost at the outset of his journey by an impassable desert of ice, the interior of that country has been a source of curiosity and interest to travellers and scientists, and of superstition and terror to the natives. Becoming interested in the subject at a time when official duties gave me an opportunity to devote some study to it, I became possessed with the desire to see for myself, and put to the test of actual practice and observation certain ideas which had forced themselves upon me. The Navy Department having granted my application for leave, I made the necessary arrangements and left St. John's, N. F., on the steam-whaler *Eagle*, Capt. Jackman, and landed at Godhavn, Disco I., June 6, 1886. The aim of my summer work was, as stated in a paper read before the Washington meeting of the National Academy of Sciences, "to gain a practical knowledge of the obstacles and ice conditions of the interior; to put to the test of actual use certain methods and details of equipment; to make such scientific observations as might be practicable; and to push into the interior as far as possible." My plan, in outline, was to gain the border of the interior ice at some point as near the

N. E. angle of Disco Bay as possible, my preference being the base of Noursoak Peninsula, and then take a course towards Peterman's Mt. on the east coast. But for various reasons I was obliged to modify my plans.

My sledging equipment was made in the lightest and most thorough manner, under my own supervision, and entirely without reference to the use of dogs. The principal items were two nine-foot sledges, thirteen inches wide, made of hickory, steel, and hide, on a modified Hudson Bay pattern, and weighing complete, with drag-ropes and lashings, twenty-three pounds each; small jacketted alcohol stoves, nine-foot double-ended ash alpenstocks with steel point and chisel, rubber ice-creepers, snow-shoes, snow-skates.

Rations consisted of tea, sugar, condensed milk, hard bread, pemmican, cranberry jam, baked beans, Liebig extract, and an experimental mixture of meat, biscuit, and desiccated potato, put up in two-pound cans by Richard & Robbins, of Dover, Delaware.

Without going into preliminary details, at midnight of June 23d an oomiak and two attendant kayaks containing eight natives, my friend Christian Maigaard, assistant governor of Ritenbenk, myself, and my equipment, rounded the southern extremity of Arveprins I., in Disco Bay, and headed across the mouth of Ikaresak Sound for the entrance of Pakitsok Fjord. Above us the clouds were heavy and leaky, and ahead every depression of the dark mountains and the underside of the black cloud canopy above them was lit up with the pale cold glare of the "ice-blink." *

* Both the native and the Danish colonists almost always refer to the inland ice as the "ice-blink," and I follow their custom.

Entering the narrow-mouthed, bluff-walled fjord, we pulled past a small native settlement, and landed and turned in. The next evening, after a reconnoissance of the upper fjord from a mountain near the camp, we pushed off just at the turn of the tide, and entered the narrow cañon which separates the upper from the lower fjord, said by the natives to be impassable except at certain stages of the tide. One wall of the cañon was glowing in the brilliant yellow sunlight which poured in a level flood through the western entrance; the other lay in deep purple shadow; between them flowed the strong deep-green current, and through the cañon the upper fjord, known to the natives as Illartlek, gleamed blue, and the summits of the inner mountains were soft with yellow light. Beyond the cañon the fjord expanded into a broad lake, contracting again several miles farther up. Above this point the water was pale green, rapidly growing shallow, whiter, and fresher.

At six A.M. we landed just east of the glacier river, which came down from the ice in numerous shallow streams, traversing a broad, level gravel-floored valley, and fell over a natural rock dam into the fjord. Looking up this valley, once occupied by ice, and once evidently an extension of the fjord, the aspect of the ice, now some three miles distant from the fjord head, was the reverse of encouraging. The next night I spent in a reconnoissance along the crest of the huge mountain dam which holds the inland ice in check. An examination of the main ice-tongue, showed that it was utterly impracticable either to ascend its vertical face, or to travel upon its surface; which, studded with huge shark-tooth pinnacles of blue ice, stretched upward in a series of terraces

separated by vertical blue cliffs, seamed and broken like walls of basalt. From the summit of one of the main peaks of the dam 2,800 ft. high, commanding the coast line of the "ice-blink" for several miles, I discovered a small tongue of ice curving down into an elevated valley, its surface crevassed and serrated in places only, and its apex, though ragged and precipitous, apparently scalable.

From the root of the tongue, the rolling ice-hummocks stretched eastward out of sight, over the round of the "ice-blink." I climbed along the mountains, a friendly snow-drift affording a passage from the rocks to the surface of the "ice-blink." Then descending along the tongue and down the ragged face, I mapped out roughly a route which should avoid the utterly impassable portions, and then returned to the tent four miles distant. It was necessary to carry the sledges, provisions, and equipment over the rocks to the ice-foot on our backs, and before this was completed, six of my natives deserted me on the plea of sickness, and returned to Ritenbenk, leaving the rest of the work to be done by Maigaard, myself, and two natives, one man and one woman. In spite, however, of this diminution of my force, we got every thing up to the ice-foot, 1,155 ft. above the sea; and at one A.M., of the 28th, the weather having changed from stormy to clear and cold, Maigaard, Frederick the Esquimau, and myself ran the slender nine-foot sledge, which we had christened "Sweetheart," on to the ice, and we began the upward climb. The steep slope was traversed by ridges, gullies with nearly vertical walls, cracks and crevasses of all widths. The trend of these crevasses and gullies was nearly at right angles to our course, and they zigzagged into each other in every conceivable manner.

Down one side of the gullies, up the other, and over the ridge into the next, we were obliged to climb, sometimes creeping along a narrow causeway between two blue crevasses, till one or the other became narrow enough to enable us to jump the sledge across it. Frequently we cut steps in the ice, and lifted the sledge bodily and almost vertically. Higher up came a smoother slope, broken into terraces; above the terraces a few rounded hummocks; and then a labyrinth of sharp ridges of flinty blue ice, crevasses, V-shaped gullies, and cañons 40 ft. to 50 ft. deep. Up the sides of these we cut steps for ourselves, and fixing an alpenstock at the top, hauled the sledge up with a light double fall of braided linen sash cord. Finally we got the "Sweetheart" up to the top of the ice-tongue, and leaving her anchored to an alpenstock, 1,955 ft. above the sea level, began our descent, reaching the tent before noon. The night was perfect, not a cloud in the sky, and the temperature just below the freezing-point. The next night we carried the second sledge, which we christened "Princess Thyra," in honor of Denmark's youngest princess, up from the ice-foot, and in the morning the "Sweetheart" and the "Princess" lay side by side upon the "ice-blink." After a hearty meal, we lay down under the lee of the sledges, but the wind and the blinding sun made sleep an impossibility. The masses of black rock beyond the margin of the "ice-blink" were tremulous in the dazzling glare; the blue fjord far below us glistening in some places like burnished, in others like frosted steel; and over and beyond the mountains, Disco Bay lay blue.

At eight P.M. the snow having hardened, Maigaard and I started due east* up the "ice-blink," while Frederick re-

* My course throughout the entire journey was east *true*, and I was compelled to make but one detour, recovering my course on the opposite side of the obstacle.

turned to the tent. As we started, the blue of Disco Bay was blotted out by a bank of pearl-white fog, which crept through the narrows, slipped over the mountains at the mouth of the fjord, and crept down their eastern slopes in feathery sprays of silver upon jet. A little later a mass of black clouds hid the sun, and at midnight the fog blotted out the land behind us. At one A.M. it overtook us; the suddenness with which it blotted out every thing and shrouded us in gray nothingness was startling. We kept on till the fog changed to sleet, and the wind increasing, I called a halt 3,000 ft. above the sea. Turning the sledges upon their sides, and placing our rubber pillows and blankets in their lee, we lay down. By this time the wind had become a gale, and the sleet, changed to snow, was driving in a continuous sheet over the tops of the sledges. We were obliged to make a small house for our alcohol stove out of the provision tins, then we drank our tea, lying flat behind the sledges all the time, and turned in. The surface of the "ice-blink" up to this point (about ten miles from the margin), consisted in general of rolling hummocks, extending nearly north and south, highest and steepest on their western slopes, which ranged from 100 ft. to 150 ft. high. The western faces of the hummocks nearest the land were grooved and crevassed, and studded with the huge shark-tooth pinnacles. In detail, the surface was, as a rule, roughly granular in texture, affording firm, sure footing, interrupted here and there by crevasses, some open, and some covered with a snow arch by patches of soft, deep snow in the depressions between the hummocks, and by patches of hard ice cut by nearly parallel furrows, as if made by a huge plough.

We lay behind our sledges, which with ourselves were soon buried in the drift, until late in the afternoon of the second day, when the steady roar of the storm broke into intermittent squalls, and crawling out we got momentary glimpses, behind and below us, of a dense mass of clouds, black beneath and dark dull lead color above, hurrying northward just above the summits of the land. The land itself, hoary in its elevated portions with the newly fallen snow, lay everywhere else as black as midnight, and the fjord had become a pool of ink. Ahead of us, a pale supernatural glare rose nearly to the zenith, and in every direction the "ice-blink," swept by furious snow squalls, and its inequalities obliterated in the shadowless light, stretched dead and silent. At six P.M. the clouds growing blacker and blacker every moment, and every indication pointing to a protracted storm, I decided to take the instruments, and go back to the tent and await more favorable weather. A little more than two hours of steady snow-shoeing down the slope, brought us to the brink of the ice-tongue overlooking the ragged descent through the crevasses and gulches to the ice-foot. At this level, rain had fallen, instead of snow, and the edges of the crevasses, the sides of the gullies, and the hard blue pinnacles were like oiled steel. Having left our ice-creepers on the sledges, we could do nothing but climb over the crest of the mountain dam and down the cliffs and slippery rocks of the other side, to the valley. Here we forded the glacier river, and at midnight reached the tent, the rain falling in sheets, the wind dashing first up, then down the valley, threatening every moment to level the tent, and the glacier river a roaring torrent. Truly, the inland ice had given us a savage welcome, but we were not yet done

with it. The storm continued during the next three days, but on the afternoon of the fourth day, July 5th, bits of blue sky were visible, and at three P.M. we again started. At ten P.M., thanks to our snow-shoes, without which we never should have succeeded,* we reached the sledges. The soft newly fallen snow covered the entire surface of the "ice-blink," except in the lower portion, where the precipitation had been nearly if not quite all rain; and the patches of soft snow encountered on the first trip were deeper, and, with the exception of the upper few inches, saturated with water. In the immediate vicinity of the margin of the "ice-blink" I noticed two entirely distinct appearances of the surface, one consisting of thin, broad, leaf-like crystals, forming a covering about an inch thick over firm dry ice, the other having the appearance of the finest moss, or the finer kinds of brain coral, and always underlaid by a few inches of slush.

Above the 2,500 ft. level the snow was saturated with water in the depressions, but dry and slightly crusted on the tops of the hummocks. Digging our sledges out and freeing them of snow we reloaded them, ate a hearty supper, and at midnight started due east again. During our climb from the ice-foot to the sledges, the coast mountains and Disco Bay had been overhung with great fleecy

* In the preparation of my equipment I had given the utmost care and attention to the foot-gear, and to its excellence and variety my entire advance was due. With my clothing it was entirely different. Misled by Nordenskjöld's experience, I made no preparation whatever, wearing ordinary clothes. Had it not been for the thoughtful kindness of Governor Juncker of Ritenbenk, who insisted on my taking his sealskin jumper, I should have suffered to the verge of actual freezing. As it was, while on the "ice-blink," I was never comfortable when the wind was blowing with any force, and even Maigaard with his double dog-skin and seal-skin jumper and dog-skin sleeping bag passed many an hour made disagreeable by the extreme cold. Nothing short of fur and the impervious integument of animal skin will keep out the searching wind of the "ice-blink."

clouds, remnants of the storm, and the summit of Disco Id. was capped with clouds. Now, however, not a cloud was visible, and the wind was freshening every moment from the east.

North and east the surface of the ice was higher, and the swells apparently longer and flatter than those already passed. Southeast lay the great feeder basin of the Jacobshavn Glacier stretching eastward into the "ice-blink," like a great bay, and up through its centre, like a tide rip in a smooth sea, glistened the ragged points of the glacier itself. Just previous to starting, while walking near the sledges without snow-shoes or alpenstock, I broke into a narrow crevasse, and as I hung for an instant supported by my outstretched arms, before scrambling out, the fragments of the treacherous snow arch went rattling down the azure depths till the echoes they awoke were like the chimes of silver bells. Our snow-shoes prevented a repetition of the occurrence in crossing the network of crevasses which extended east from our camp. As we advanced these disappeared, and in the cold of the early morning the entire surface became one firm unbroken crust, affording excellent walking. Two or three small ponds which we met were frozen just hard enough to support us as we half slid, half skated rapidly across on our "skier," (snow-skates). While crossing another, Maigaard followed me too closely; the ice, cracked and weakened by my passing, broke, and let the "Princess" through in some five feet of water, and it was only with the utmost difficulty that we got her out and to the bank again. This mishap, and the wind now increased to a gale dead ahead, brought us to a halt in a hollow 3,300 ft. above the sea, and we turned in in the lee of the sledges for a few hours' sleep,

after which we spent the day drying our foot-gear and Maigaard's sleeping gear, saturated by the accident and frozen stiff. The lowest temperature during this march was 28°. The wind blew fiercely all day, and the warmth of the sun formed a layer of coarse wet snow three to four inches deep. Beneath the snow the ice was apparently unbroken, assiduous probing with an alpenstock failing to detect any crevasses or water cavities. As soon as the sun got round to the northwest, and the snow had hardened sufficiently to support the sledges, we strapped our snow-shoes on and started again. We soon reached a long narrow lake stretching across our path far to the right and left, and not yet frozen hard enough to support us. To flank this lake cost us a detour of two miles, and even then we were compelled to wade through the morass of water-saturated snow, which surrounded it and extended still farther on either side, our snow-shoes being useless in the semi-liquid slush. Soon after midnight we were able to dispense with snow-shoes, the snow surface being firm and coarsely granular, with occasional small patches of snow of marble-like fineness and whiteness, souvenirs of the last storm; and later, frequent areas of glazed snow, of such hardness that even the brads in our sandals and the steel-shoes of the sledges scarcely left a trace. Again the morning gale brought us to a standstill 4,100 ft. above the sea, the entire surface of the "ice-blink," as far as we could see, glazed and shining beneath the morning sun, with a blinding brilliancy impossible to describe. The lowest temperature during this march was 25°, and the sky cloudless except a few delicate cirrus feathers, stretching east and west. Taught by our experience at previous camps, that it was impossible to sleep

exposed to the powerful glare of the sun, and the searching sweep of the wind, and having at this camp suitable material, we built a rough hut, cutting blocks of snow with a long, narrow-bladed saw, and building a low wall around three sides of a rectangle, over which we spread a rubber blanket and weighted it down with the sledges.

During the next march we passed, at an elevation of 4,500 ft., an upheaval of the ice, extending in an irregular ridge from 6 ft. to 15 ft. in height, and about a mile in length, northeast and southwest. Deep cracks ran along the crest, and others radiated from the higher points, just as the ice in a river or pond cracks and bulges upward when a fall in the water allows it to bear upon the rocks beneath. North of this ridge lay a smooth and perfect bowl-shaped basin some 50 ft. deep and one half mile in diameter, with other upheavals along its farther edge. At five A.M., from top of a swell 4,600 ft. high, we saw the last land, the tip of one of the Noursoak Mountains, showing a speck of rose above the blue snow horizon. The top of the next swell, 100 ft. higher, was thickly covered with fine sastrugi and dainty scallop-shells of snow, the size of the hand, all with the concave side down, giving the surface the appearance of being ruffled into wavelets by a stiff breeze. The wind, as usual, blew freshly in our faces all night, increasing in strength as the sun reached the east. Two or three clouds, which lay in the southeast when we started, kept increasing till they covered half the sky. Far up the most delicate cirrus clouds hung motionless, while the others drifted rapidly beneath them. Two or three very dense banks loomed up from the southeast as if for snow, but finally broke to pieces. Lowest temperature during the night was 28°. The house here was

much more difficult to build than the other, the snow being interspersed with layers of tough transparent blue ice from half an inch to one inch thick, and very difficult to cut, even with the saw. It was late before the snow hardened, and when we started the southeast wind was bringing up dark clouds, which soon covered the entire sky. At two A.M. a dense cold fog enveloped us, turning an hour later into a fine drizzling rain. The sledges sank till the entire bottom dragged, the wet snow clung to them, and clogged our snow-shoes, till travelling became too laborious, and we halted. The following day it was very warm during the forenoon, and peculiar opaque white clouds covered the entire sky like a thick coat of enamel. Curiously enough, these clouds seemed to intensify the glare from the snow, and make it (if I may use the word) suffocating. Later they disappeared, and the sun shone brightly. The temperature still remained high, and as the snow did not harden at night, and both Maigaard and myself were tired, we decided to stop here one day and rest and put our foot-gear in order.

The next afternoon, for the first time since we came on the ice, it fell perfectly calm. In less than an hour after we took up our line of march again we reached an altitude of 5,000 ft., and stopped a moment to drink a health to the "Sweetheart" and the "Princess." A little before midnight we ascended a swell on which the barometer said 5,300 ft., and found it traversed by six parallel crevasses spaced about 100 yards apart, and extending north and south as far as we could see. The first one was about 15 ft. in width, the snow which covered it being depressed about a foot below the surrounding surface. The others were narrower. Far to the south the edges of all seemed

to be ragged and broken, and the snow arches fallen in. Testing the arch before us with an alpenstock, and finding it apparently strong enough, we rushed the sledges rapidly across, and went on. Our lunch was eaten at an elevation of 5,500 ft., and when we resumed the march the wind, almost imperceptible when we left camp, blew very fresh in our faces; the temperature was 18°.5, and our snow-shoes were discarded. At six A.M. we halted in one of the broad troughs between two swells, the wind blowing a gale, and the temperature 19°. The snow here was too hard to cut, and we were obliged to turn in on the sledges. In our next march we reached at 1:30 A.M. an altitude of 6,000 ft., and again drank the health of the "Sweetheart" and the "Princess." A few moments later a dense white fog enveloped us, and in an instant clothes and sledges were coated with milk-white ice crystals. The temperature was 16°. This fog enveloped us about two hours; then passed away to leeward. Before we halted, however, we passed through two more banks of it. The elevation of our next camp was 6,200 ft. At one A.M. on the next march we reached an elevation of 6,500 ft., and at two A.M. the thermometer stood at 8°.5. Fortunately, the atmosphere was comparatively still, otherwise we would have felt the cold severely. The wind was light, the sky partly covered with light, veil-like clouds; the snow crackled beneath our feet, and sparkled in the frosty air, as if sprinkled with myriad gems. In spite of the low temperature, however, the crust lacked the firmness which it had at lower elevations, frequently letting us break through, and the snow was dryer and finer. From three A.M. till four A.M. a brilliant parhelion filled the northeastern sky with rainbow hues, and elicited answer-

ing flashes of color from the glittering snow-field. We put on our snow-shoes before beginning our next march over the then weak crust, and during several succeeding days they were off our feet only when we were in our sleeping bags. The fierce east wind during this march made the temperature of 10° almost unbearable. Every bit of metal stuck to our fingers or lips, and boiling tea was cold almost before we could get it to our mouths. At three A.M. we tallied 7,000 ft., and at six A.M. went into camp at an elevation of 7,200 ft.

A can of beans, which with tea formed our supper, had to be chopped in halves with the hatchet, and its contents extracted and eaten with the same implement. My internal economy took exception to this frozen ration, and unable to sleep, I passed the time drying and mending my foot-gear, and improvising mittens out of some spare socks. At noon the wind had moderated, but later it came very fresh from the southeast, bringing up heavy clouds, which, when we began our next march, covered the entire sky. Just after midnight we got a dash of fine rain, and at two A.M. it began to snow, the wind blowing with increasing violence from the southeast. We advanced against this storm till six A.M., when we camped at an elevation of 7,450 ft. It was impossible to build a house from the dry, incoherent snow at this camp, and we were again compelled to turn in behind our sledges. The day passed with alternating bursts of sunshine and snow-squalls, which whirled and eddied about the sledges, and in spite of our utmost efforts, drove the fine snow into every corner of our sleeping bags. When we resumed our march on the 15th, the wind had settled down to a steady southeast gale loaded with snow; and against this

we advanced with goggles on, hoods pulled up, and heads down, keeping our course by the wind, until the sinking of the sledges in the soft snow, and the continual clogging of our snow-shoes, compelled us to halt and wait the cessation of the storm. The lowest temperature during the night, 21°; elevation of camp, 7,525 ft. Too tired and sleepy from our struggle with the storm to build a house, even had the loose snow rendered it possible, we turned in behind our sledges and immediately went to sleep. When I awoke we were completely snowed under, and here we lay for forty-eight hours with the wind and snow driving in one incessant, sullen roar across the drift above us; crawling out but once to make some tea and get the cramp out of our limbs. This proceeding we both regretted, as the fine snow was driven into every fibre of our clothes, and when we crawled down into our dens again, it melted, turning our comparative comfort into cold, wet misery. Sunday morning we crawled out during a lull in the storm, and dug a shallow pit, covered it with a rubber blanket, excavated our sledges and bags, placed the sledges on the blanket, threw our bags underneath, and crawled after them. A pint of hot tea each, and a square meal, made us feel as if we were the proprietors of a palace, and though the storm raged twenty-four hours longer, we were comparatively comfortable.

About five A.M., Monday the 19th, a narrow ribbon of crystalline blue appeared beneath the clouds in the south-east, and widened and grew until it reached the sun. Then followed a perfect day, warm, clear, almost calm, enabling me to get a good observation, and permitting us to dry all our gear. Our camp, 7,525 ft. above the sea, and within a fraction of one hundred miles from the margin of

the "ice-blink,"* lay in a shallow basin, the snow previous to the last storm, of the consistency of fine granulated sugar, as far down as I could force my alpenstock (some six feet).

We had six days' provisions left, and being uncertain as to the changes in the lower portion of the "ice-blink" during our absence I decided to return. We lashed the "Sweetheart" and the "Princess" together, an extra pair of snow-shoes serving as cross-bars, improvised mast and yard from our alpenstocks, and sail from a rubber blanket; and late in the afternoon we had as big, strong, and flexible a little catamaran as one could wish to see; the black sail, yellow spars and hulls, red sailing pennant, and the flashing tins of the load, forming a vivid contrast to the

* This distance is based on an excellent series of twelve circummeridian sights at this camp, with the theodolite placed within the walls of our hut to protect it from the wind; a series of ten similar sights at the tent; and time as given by one of the best Elgin watches, carried, during the five days intervening between the observations, in a pocket on the inside of the bosom of my flannel shirt. Having carried the watch two or three years, I know its variation in that time could by no possibility exceed thirty seconds either way. For several reasons no other observations are given.

In the selection of my instrumental outfit, I had chosen a light, traveller's theodolite, as being lighter and more generally useful than a sextant and artificial horizon. But under the conditions of continuous wind and deep snow which I encountered, it was impossible to use the theodolite except by setting it in the compacted bottom of a snow-house after we had slept in it, with the wall of the hut to shield the instrument from the wind.

In scaling the glacier face, my chronometer had had the usefulness shaken out of it, and after this loss I did not feel disposed to add the labor and discomfort of observations of approximate value only, to the constant and imperative demands of the numerous details, attention to which was the price of our advance. My daily advances were only estimated, and therefore I do not present the distances.

The elevations are those indicated by one of Keuffell & Esser's best $26 pocket aneroids, with attached thermometer and compass. The ascent on the outward trip, as shown by this barometer was 7,525 ft., the descent on the return (one hundred and thirty-three hours of continuous fine weather), 7,450 ft. Mean, 7,487 ft. 6 in.

Temperatures were shown by a Signal Service thermometer.

unbroken white expanse of the "ice-blink." At six o'clock at night we started on our return beneath a cloudless sky, the wind southeast and light. At first the sledges sank in the snow till the full width of the bottoms dragged, but about midnight the wind changed into the east and freshened, the snow became somewhat firmer as we descended, and the sledges began to crowd us and run upon the heels of our snow-shoes, so we dropped the drag-rope, and each taking a projecting end of the alpenstock which formed the yard, travelled beside them. In spite, however, of the relief from dragging the sledges, the travelling during this night was extremely trying, patches of fine snow of chalky whiteness, into which our snow-shoes sank deeply, alternating with glazed surfaces so hard and slippery it was almost impossible to keep our snow-shoes under us, and sastrugi, firm and white as if carved from marble. Over these sastrugi the sledges would have travelled like the wind, while we could only hobble along, getting a tumble every now and then. A peculiar phenomenon noticed during this march was the apparent sinking of large areas of snow at intervals as we passed along, accompanied by peculiar muffled reports which rumbled away beneath the crust in every direction until they died away; just as happens when one is skating upon a freshly frozen lake in early winter. The sky above was flawless blue, the crimson sun in one direction, the yellow moon opposite, and the plain on which we travelled spread with diamond dust. At midnight the northern sky was a sea of crimson light, and the snow lay bathed in delicate shades of rose. When we halted at five A.M. the aneroid showed a descent of 650 ft. All day long on the 20th the east wind blew, and when we

started again the sledges went merrily along before it, requiring no exertion on our part other than to guide and restrain them. At first we encountered the sastrugi and alternating patches of soft snow and slippery ice as on the preceding march, but when we reached an altitude of 6,000 ft. these all disappeared, and the snow was covered with a thin, uniform, coarsely granular crust over which the sledges would have dashed with great rapidity had we loosed our grasp upon them. As we continued to descend, the crust on some of the slopes became firm enough to allow one of us to ride, while the other travelled behind and guided the sledges. During this march we descended 950 ft., and sky and snow were again brilliant with indescribable splendor. Not a cloud was visible except, at a great altitude, two or three delicate motionless "mare's tails," the banners of the wind. The snow dust raised by our snow-shoes went hurrying along before us in two long sinuous lines of pale rose-tinted smoke, twisting and waving like spirits of the ice at play. The lowest temperature during the march was 18° F., and when we halted the wind was howling like a demon past the sledges. After rigging a rudder (a hatchet lashed to the end of a snow-skate) to the catamaran, we turned in on the sledges. At this camp we succeeded in melting snow in a rubber blanket shielded from the wind, and for the first time in ten days had an unstinted drink of water. The wind continued without cessation, but it was late before the crust was firm enough to support the sledges. Every moment, however, the biting wind made it firmer, and as the yellow sun stooped to the northern horizon Maigaard and myself took our places upon the sledges and began a bit of travelling, which as far as I know has

no parallel in Arctic work. From midnight till five A.M. we sped along, taking the levels at the speed of a fast walk, and dashing rapidly down the inclines, the hatchet rudder working admirably.

At five A.M., having descended 1,250 ft., a series of broad white bands on the top of a swell below and ahead of us made us get off and walk the sledges up to reconnoitre. Just as we rose on the swell enough to make out that the white bands were a group of enormous snow-covered crevasses across our path, the land Noursoak and Disco, dark and half shrouded in haze, leaped up from the white expanse below us with a suddenness that was absolutely startling. I had expected to see the land before we went into camp again, but imagined it would appear gradually, the same as it had disappeared on the outward trip, instead of flashing into sight in this manner. The explanation of this, I soon discovered, was that during the preceding five hours, while sitting upon the sledges and steering a course by the sun (the motion of the sledges rendering the pocket-compass useless), the fear of falling off to the south into the basin of the Jacobshavn Glacier had unconsciously made me keep up to the north too much, and I was now about four miles north of my outward route and considerably higher. The crevasses, the most magnificent ones we had seen, were many of them 50 ft. wide, and the group was about half a mile across. As a rule, they were covered by snow arches, though in several places these had fallen in. Not caring to make a detour, and the snow arches being apparently strong, we rushed the sledges over, taking flying steps and half supporting ourselves on the yard of the catamaran as the wind and the impetus of

our run hurried us across. The edges of all the openings into these huge chasms had an overhanging lip of snow, making it impossible to approach them to sound or look down. We could only get hasty glimpses into them as we passed over the snow arches, and these showed that their ragged blue walls, hung with giant icicles and frost work of fantastic patterns, descended into depths of blue black night.

Beyond the crevasses the descent was very rapid and jumping; on the sledges again we began an exciting run. The wind straining the sail till it threatened to tear it from the mast, and the rapid descent together, drove us down the frozen slope with a breathless rush, which only those who have been on a toboggan can understand. After dropping 300 ft. the descent became less rapid but the crust was more icy, and we dashed rapidly along for an hour, the supple catamaran gliding over the snow, and rising and falling to every inequality with sinewy ease and grace.

There are two who will not soon forget that glorious dash down the slope of the eternal ice in the crisp air and rosy light of that Arctic summer morning. At the end of an hour we had descended 600 ft. and as we dashed over a hummock and started down its western slope, a lake of deepest ultramarine flashed into view beneath us. Hauling the catamaran close to the wind we dashed diagonally down the slope and just cleared the end of it. Beyond here every depression was occupied by a blue pond, often hidden by the hummocks until we were almost into it, and we were compelled to get off the sledges, take down the sail, and walk until we were stopped, shortly after eight A.M., by a broad

morass of slush and water extending right and left as far as we could see.

The total descent during this march was 2,125 ft. On the southern slope of some of the hummocks in this region of ponds, the snow had melted into a conglomeration of rounded ice pellets the size of marbles, while on the northern slopes it still remained smooth and white. On several of the steeper hummocks large areas of the snow on the sides had slid down to the bottom, leaving the underlying ice bare. The ice thus exposed was at a little distance indistinguishable from the ponds, both being of the deepest ultramarine. The effect of these false ponds lying quietly on the side of hummocks was to give the landscape of the "ice-blink" a peculiar, topsy-turvy, unreal aspect. The snow where we halted was a mass of heavy slush, and, after lying awake till noon to get a meridian observation, I turned in on the sledge with smarting face and eyes feeling as if bathed in fire, the wind threatening to pick us up bodily and hurl us into the swamp ahead.

Here we remained until midnight, waiting for the surface of the morass to freeze sufficiently to support us. Scarcely 50 yards from camp, however, we found the ice too weak even for snow-shoes, and we sank to our knees, the shoes coming up loaded with slush, at a temperature that needed but a touch of the air to make it congeal. To make a detour in the face of the wind was an impossibility, and after a little reconnoitring we started straight across the morass, the sledges sometimes entirely submerged, plowing through the slush, and leaving a broad trench behind them which immediately filled with water, forming a canal that would have floated

a whale-boat. Fortunately, the depth of the slush and water did not exceed three feet, and fording the stream which ran through the centre of the morass, we at last emerged upon dry ice, and clearing the sledges of their load of slush, started on the run to restore sensation to our feet. During the next seven hours these half-frozen morasses alternated with hard blue ice honey-combed with water cavities. The latter made very rough and semi-dangerous travelling for Maigaard and myself, though the sledges under reefed sail glided along almost as smoothly as on a newly frozen pond, supporting and even dragging us along when our feet went into the holes. Then the character of the ice changed completely, the slush and water cavities disappeared, and the entire surface consisted of a white granular snow-ice scored in every direction with furrows one to four feet deep, and two to eight and ten feet wide, with a little rill at the bottom of each.

The tops of all the hummocks were also traversed by more or less numerous crevasses, not sufficiently wide, however, to give us much trouble. But the furrows were very severe upon us, wrenching arms, back, and legs with the constant pushing, pulling, lifting up and easing down, and pounding the sledges continuously, as they pitched from the top of one ridge upon the slope of the next or into the ditch between them. Besides this, our feet were kept constantly wet by the brooks. As the sun gained in altitude a light mist in the fjords and valleys brought out the features of the land distinctly, and I could make out Illartlek, though the pass by which we had ascended was still hidden below the round of the "ice-blink." From here on the travelling

was rougher than ever, being a constant succession of up hill and down, with rivers in the valleys, crevasses on the summits, and the muscle-straining furrows on the slopes, each of these features growing bolder and more pronounced as we got lower and more within the disintegrating influence of the heat reflection from the land. One of the crevasses, covered by a light snow-arch, came near robbing me of my friend. We had pushed the catamaran across, as was our custom, till it rested at each end on the opposite edges of the chasm, and had jumped across to pull at the same instant that Maigaard pushed. Unfortunately, he tripped as he sprang after, stepped heavily upon the snow-arch, it gave way beneath him, and clinging to the stern of the catamaran, he sank into the crevasse, while the bow shot into the air with a jerk that nearly tore it from my grasp. For a moment the sledges hung tilted on the lip of the chasm, with a man's life hanging on their quivering forms; then the bows descended, and Maigaard's head came up to the surface level; the sledges crept farther into the ice till the long arm of the lever was in my favor, and Maigaard, pale but smiling, swung himself up on the ice with a careless "ayungilak" (all right). A little farther on I came in for a disagreeable though harmless experience. Having stepped down mid-thigh deep in a glacier stream to lift the "Sweetheart and the "Princess" across, the current swept my feet from under me, plunged me into a deep hole just below, then rushed me along between the polished banks with a noiseless velocity which almost made me dizzy. I was beginning to get irritated at my utter helplessness in this stream, scarcely more than six feet wide or more than five feet deep, when a shallow place

gave my spiked sandal a point of application for a spring against the steep bank up which I scrambled, and ran to help Maigaard, who was barely able to hold the half-submerged sledges against the current. It would have broken both our hearts to have lost them now. We kept on until one P.M., when, tired with the severe work of the last thirteen hours, we halted in the fork of a stream 3,000 ft. above the sea, and turned in. The pain in my eyes, together with my cracked and blistered face, and the condition of my hands, severely cut by the sharp ice in emerging from my bath, rendered sleep an impossibility for me.

Resuming our march when the sun was in the northwest, we found the furrows and crevasses increasing in number and width as we neared the land. After the sun rose from its short dip below the northern horizon, we forgot every thing in the splendor of the morning. The wealth of deep, rich coloring among the dark mountains below us was wonderful, and through their massive portals we caught glimpses of the deep blue of Pakitsok and Kangendluarsarsoak fjords, and farther away Ikaresak Sound. Behind us the yellow sun floated along above the steel-blue line of the frozen horizon through a sea of liquid fire. At three A.M. we reached the edge of the ice-tongue, anchored the sledges, and with the instruments rolled up and slung on my back began the descent of the glacier face, and reached the ice-foot at five A.M. In this descent was concentrated about all the real peril and danger of the entire trip. All the more salient features were the same as when we made the ascent three weeks before, and we could easily trace our upward route, but those three weeks of Arctic summer

had transformed every inch of surface into solid glistening, unctuous blue ice, and every detail was sharper, deeper, more angular, more heavily accented, like an etching longer exposed to the acid. Ridges which then were broad enough to permit a sledge to pass with a man on each side were now mere knife edges; crevasses that could be jumped then were impassable gulfs now. With only a short theodolite tripod to serve as alpenstock for both, we picked our way down, traversing the crests of some of the ridges, as slaters walk the ridge of a house, and sitting astride of others and sliding along. Once Maigaard, in reaching for the tripod which had fallen from his grasp, slipped, fell on his back, and went shooting down a steep slope, stopping himself with his spiked heels just on the brink of one of the yawning blue crevasses. As we went down the valley we found a new tribe of flowers had made their appearance during our absence. In some places the sod was covered with large purple blossoms, and delicate bluebells were abundant everywhere. The heat in the valley even at this early hour was oppressive to us, accustomed to the cold atmosphere of the "ice-blink," and when we reached the tent at seven A.M., I was carrying about all my wearing apparel except foot-gear slung at my back. Two days later my eyes and face had regained something like their normal condition, and we packed the sledges over the mountains and down to the tent on our backs, and returned to Ritenbenk. Here much to my regret I was obliged to part with my tawny-bearded, blue-eyed friend Maigaard, and go on alone to the Torsukatak Glacier and the base of Noursoak Peninsula. All my foot-gear was much the worse for wear, and I knew that whatever I might be able

to accomplish now would have to be done literally single-handed, as the natives would not go on the ice, yet I could not rest till I had examined the ice behind the peninsula. Lack of space forbids any description here, but my trip over the "ice-blink" from Torsukatak Glacier to great Kariak Glacier, and my examination of the coast line of the "ice-blink" across the base of Noursoak Peninsula were to me extremely interesting. After spending nine days in this work I returned to Kekertak, visited the fossil beds of Atanekerdluk, thence to Ritenbenk, then across the Waigatt to Ujaragsugsuk on Disco Id., and along the coast of Disco back to Godhavn. Sept. 6th I went on board the *Eagle* again, and crossing Baffin's Bay to Dexterity Harbor, just N. of Cape Cargenholm, worked thence down along the west coast to Cumberland Gulf, and from there to St. John's arriving at the latter place Nov. 17th.

The characteristics of such portions of the "ice-blink," as came under my personal observation, may be stated as follows. The coast line shows a great diversity of features, dependent upon the altitude, the season, and the elevation and configuration of the adjacent mountains. Wherever the ice projects down a valley in a long tongue or stream, the edges contract and shrink away from the warmer rocks on each side, leaving a deep cañon between, usually occupied by a glacier stream; and the upper surface, disintegrated by the reflected heat from the mountains above, and shattered by the daily change of temperature more perhaps than by the forward flow, presents a chaotic labyrinth of crevasses, gullies, and ragged pinnacles, increasing in magnitude in direct proportion to the length of the tongue and its approach to the sea level.

Smaller tongues or teats, rounding down into shallow indentations in the crest of the mountain dam, are apt to have only their tips ragged and their upper surfaces covered with a net-work of narrow crevasses. Higher up, along the unbroken portions of the dam, where the rocks have a southern exposure or rise much above the ice, there is apt to be a deep cañon between the ice and the rocks; the ice-face sometimes 60 ft. high, pure, pale-green, and flinty. In another place the ice-face may be so striated and discolored as to be a precise counterpart of the rock opposite, looking as if torn from it by some convulsion. The bottom of the cañon is almost invariably occupied by water. Where glacier streams find an exit through the crest of the dam, and there are no adjacent rocks higher than the ice to push it back with their reflected heat, the ice will reach down upon the rocks in a dome-like slope. Frequently drifts of fine hard snow extend like causeways from ice to rock, through the bases of which the littoral glacier streams tunnel a passage. Still farther up, at the very crest of the dam, the ice lies smoothly against the rocks. As to the features of the interior beyond the coast line, the surface of the "ice-blink" near the margin is a succession of rounded hummocks, steepest and highest on their landward sides, which are sometimes precipitous. Farther in, these hummocks merge into long flat swells, which in turn decrease in height towards the interior, until at last a flat, gently rising plain is reached, which doubtless becomes ultimately level.

In passing from the margin of the "ice-blink," to the remote interior, from one to five distinct zones may be noted, the number and width varying with the season,

the latitude, and the elevation. In winter the entire surface is undoubtedly covered with a deep unbroken layer of fine dry snow. Late in the spring, the warmth of the sun at mid-day, softens the surface of the snow along the low borders of the ice, and this freezes at night, forming a light crust. Gradually this crust extends up the interior, and with the advance of the season, the snow along the borders of the "ice-blink" becomes saturated with water. A little later this zone of slush follows the zone of crust into the interior, the snow along the borders of the "ice-blink" melts entirely, forming pools in the depressions, and streams which cut deep gullies in the ice; water cavities form; old crevasses open, and new ones appear. This zone rapidly widens and extends into the interior in the footsteps of the others, and behind it the immediate border of the ice gets ragged and soiled, pebbles, bowlders, and moraines crop out of its melting surface, and by the end of the Arctic summer it is eaten and shattered by the heat, and eroded by the streams, into impassable roughness.

1st. In any attempt to penetrate to the interior, the "ice. blink" should be attacked at some point as far above the level of the sea as possible, rather than the reverse, as has hitherto been done. It is infinitely easier to get sledges, etc., a thousand or even two thousand feet up the mountain on the back, even though the ascent be nearly vertical, than by attacking the "ice-blink" near the sea-level, to lift and drag them over miles of ragged ice and across innumerable crevasses before reaching an equal altitude.

2d. A place should also be chosen, if possible, where the presence of large and rapidly discharging glaciers indicates a rapid ascent to a highly elevated interior, in close proximity to the coast.

3d. Hudson Bay sledges must be used, and every member of the party must be perfectly at home on both snow-shoes and "skier" (snow-skates).

To a small party thus equipped, and possessed of the right mettle, the deep, dry, unchanging snow of the interior is not a *bête noire*, but something to be reached, as noted above, at the earliest possible moment, and once reached, it is an imperial highway, over which a direct course can be taken to the east coast, and from the heights of the "ice-blink," or the summits of its mountain dam, with miles of the coast lying like a map below, as I saw the entire circuit of Disco Bay, and, at another time, Noursoak Peninsula, Omenak Fjord, and Svarten Huk Peninsula, it can be charted with an ease and accuracy unknown to one toiling along from headland to headland of the sea-coast.

Such a party, in a series of explorations from different points of the Baffin's Bay and Smith Sound coasts, could, in case the "ice-blink" is coextensive with the northern coast, fill out the incomplete coast-line, fix its northeastern limit, an achievement second in interest only to the discovery of the Northwest Passage and the North Pole, and complete our knowledge of Greenland.

To speak more in detail, the first step would be to cross from the base of Noursoak Peninsula, to the head of Francis Joseph Fjord, on the east coast, and return. Then, with the experience thus gained, start from Whale Sound, and keeping sight of the land, follow the margin of the "ice-blink" either into the northeast angle of Greenland or to its intersection with the east coast in a lower latitude, as the case may be. This route I believe to be the key to the solution of the Greenland problem.

If to the above be added a profile from Disco Bay southeast to Cape Daw, nothing would remain but minor details.

GEOGRAPHICAL NOTES.

CARTOGRAPHY OF THE EGYPTIAN SOUDAN.—A note under this head on p. 70 of BULLETIN No. 1, for 1887, has called forth the following letter, which explains itself, and finally disposes of a story recognized as incredible, though supported by the respectable authority of *Le Mouvement Géographique:*

TWYFORD MOORS, WINCHESTER, Aug. 30, '87.

SIR:—Since my return to England my attention has been drawn to an article in the "Bulletin of the American Geographical Society," by Mr. George C. Hurlbut, "Cartography of the Egyptian Soudan," p. 70, vol. xix., No. 1, '87.

The article contains an extract from *Le Mouvement Géographique*, of Brussels, which extract is, in its turn, an extract from a paragraph taken from the Cairo *Bosphore Egyptien.* The purport of the article is that the valuable collections of maps and plans formed by the exertions of Stone Pasha were destroyed by the orders of some English officers of the Egyptian army some time in '86. I, sir, was in temporary command of the Egyptian army when the original paragraph appeared in the *Bosphore Egyptien*, and I did not deem it either necessary or desirable to take any notice of it. When, however, it is requoted in a journal so deserving of consideration as that of the American Geographical Society, it is time to contradict the statements it contained. The facts are

these: In '86, when alterations were taking place in the head-quarter office of the Egyptian army, I made arrangements for the better distribution and also security of the maps and plans belonging to the office. During this rearrangement some losses, which probably occurred during the interregnum between Arabi's fall and the restoration of order after Tel el Kebir, came to light in consulting the registries; happily few of these losses were of importance and [they] could be easily replaced.

For the rest, the value of the late General Stone Pasha's work is fully recognized by the officers of the Egyptian army. The maps, plans, and records, for which we have to thank the late lamented chief of the staff of the Egyptian army, and his talented assistants, the information collected with so much energy and devotion by Long, Prout, Colston, Purdy, and Mason, under Stone Pasha's able guidance, are properly guarded and cared for, and will be a lasting record of Stone Pasha's eminent services in Egypt. I trust that this contradiction may be given due publicity in the Journal of the Society, and beg to remain, sir,

Your most obedient servant,

HENRY HALLAM PARR,
Colonel Somerset 4th Infantry, and
Adjt.-General Egyptian Army.

Hon. CHAS. P. DALY,
President American Geographical Society,
11 West 29th St.

TOPOGRAPHICAL MAP OF THE UNITED STATES.—In his Sixth Annual Report the Director of the U. S. Geological Survey gives an account of the work on the Topographical Map, up to July, 1885. The present purpose for which the map is constructed is the representation of the areal geology

of the country; but once constructed and engraved, the plates may be used in very many ways and for various ends, as in the study of drainage systems, of the regimen of rivers, of irrigation, of the distribution of forests, of catchment areas for the supply of water to cities, as well as for the laying out of highways, railroads, and canals, and for strategic and administrative purposes in war.

The organization embraces an astronomic and computing division, a triangulation corps, and a topographic corps, organized into twenty-seven parties, scattered over the United States.

The geographic basis of the map is a trigonometric survey.

The hypsometric work is based on the railroad levels of the country, and from these the reliefs for the whole area are determined. The topography is executed by a variety of methods, adapted to the peculiar conditions found, the plane table being used to a large extent.

The map sheets are on three different scales, 1:62,500, 1:125,000, and 1:250,000, or, approximately, 1 mile to the inch, 2 miles to the inch, and 4 miles to the inch. The considerations governing the scale are present or prospective density of settlement, economic importance, complexity of geologic phenomena, and degree of detail in topography.

The map is constructed in contours, with vertical intervals of 10, 20, 50, 100, and 200 feet, varying with the scale of the map and the magnitude of relief features. The unit of the map sheets is the square degree, *i. e.*, one degree of latitude and one degree of longitude. On the 4-mile scale each square degree forms one sheet; on the 2-mile scale the square degree forms four sheets; and on

the 1-mile scale there are sixteen sheets to the square degree.

The sheets are engraved on copper in three tints; the hydrography in blue, the hypsography in brown, and the lettering and culture in black.

The area of the United States, exclusive of Alaska, is about 3,000,000 square miles.

Mr. Henry Gannett, Chief Geographer, in a paper contributed to *Science*, of July 29, 1887, states that there had been mapped, up to the 1st of July of this year, 250,000 square miles. The work proceeds at the rate of something less than 60,000 square miles a year; a rate rapid enough, considering the quality of the work, to satisfy the most exacting critic.

Mr. Gannett explains that the term *culture*, as applied to this map, is limited to all such of the works of man as have relation to communities as distinguished from individuals.

The classification adopted by the Survey is necessarily not by States, and it may be of interest to add the figures for the sheets published, according to States and Territories: Alabama 2, Alabama-Georgia 1, Arizona 12, Arizona-Nevada 1, California 6, Kansas 4, Kentucky 1, Kentucky-Virginia 1, Kentucky-Virginia-Tennessee 2, Maryland-West Virginia 1, Massachusetts 3, Missouri 12, Missouri-Kansas 4, Montana 3, Nevada 5, New Mexico 2, North Carolina, 2, North Carolina-Tennessee 1, Tennessee 5, Tennessee-Georgia 1, Tennessee-North Carolina 5, Texas 9, Utah 17, Virginia-Kentucky 1, Virginia-Tennessee 1, Virginia-Tennessee-North Carolina 1, Virginia-West Virginia 2, West Virginia 3, West Virginia-Kentucky 1, West Virginia-Virginia 2, Yellowstone National Park 4.

XUM

MANCHURIA.—The *Scottish Geographical Magazine* for August, summarizes from a Parliamentary Blue Book the report of a journey in this border-province of the Chinese Empire, by Mr. Fulford, a student-interpreter in the consular service.

Passing by Mukden, Mr. Fulford crossed a spur of the Long White Mountains (Shan Alin) to the upper Sungari valley. The mountains were well wooded, and the higher portions were found to be inhabited by hunters, who, not being sufficiently protected by the Chinese authorities at Kirin, have set up a government for themselves. On the summit of the Pai Shan, in this range, an extinct volcano, 8,000 feet high, and covered for a thousand feet from the top with pumice, lies a great lake from which flow the two branches of the Sungari.

Mr. Fulford followed this river to Kirin, where he was kept for a month by rains, then proceeded to Tsi-tsi-har, and thence to Hulan, in the centre of a very fertile district, now attracting a large immigration from the south.

The people are actively engaged in the distillery of spirits from millet. At Hunchun, on the Russian and Corean border, Mr. Fulford found the Coreans trading freely and crossing the frontier as they pleased. They are invariably addressed as "Men of the Little Nation," by the disdainful Chinese, who style themselves the "Great Nation," as naturally as if they spoke French. Six miles beyond the Hunchun (?) River, in the yard of an inn, Mr. Fulford saw the brass pillar erected by the Imperial Commissioner Wu Ta Cheng, to commemorate the settlement of the disputed frontier.

On his return, the traveller visited Kuan Cheng-tzu, a busy town of 7,000 people, 80 miles northwest of Kirin.

In this excursion through the southeast portion of Manchuria, Mr. Fulford was struck by the absence of archæological remains. The mineral resources of the region seemed to be limited to a little iron, coal, and gold. The poppy was very largely cultivated, so that in the country near Hulan opium was used in place of money as a circulating medium. The foreign opium, which does not last as well as the native, has been driven out of the market.

In taking leave of Mr. Fulford's report, the *Scottish Geographical Magazine* condemns with great severity the carelessness and the blunders which deform the Parliamentary publications, especially in the matter of geographical names. The errors are so gross, that it might be supposed the documents "were produced by some hedge-side press in a district of political disturbance, rather than by the authorized printing-presses of one of the oldest and wealthiest governments in Europe."

The North Sea.—Dr. Hugh Robert Mill gives, in the August number of the *Scottish Geographical Magazine*, the results of explorations in the North Sea, made by the German gun-boat *Drache*, in the summers of 1881, 1882, and 1884.

The configuration of the sea is peculiar. It is divided from the Norwegian Sea on the N. by a line drawn from the north of Shetland to Sogne Fjord, in lat. 61°. On the E. it is bounded by the coasts from Norway to Holland, on the S. by Belgium and the 51st parallel of latitude, and on the W. by the eastern coast of Great Britain. The depth, nowhere very great, decreases rapidly to the S. and E.; and a range of banks runs N. E. from

Flamborough Head to the Skagerrack. From the British coast, to the N. and E., the water has a depth of about 50 fathoms, with a gradual increase until, at 60 miles from the Norwegian coast, there is an abrupt change of slope, producing the great gully, more than 200 fathoms deep, which encircles the southern end of the peninsula. On the N. and W. where the sea is deeper, the land is high, while on the eastern shore it is low and flat.

Communication with other waters is by three channels, one to the N., one to the S. through the Strait of Dover, and the eastern passage to the Baltic.

In the North Sea, which is agitated by tides down to the bottom, enormous quantities of fresh and brackish waters are poured in from the rivers and the Baltic, and the changes of warmth between winter and summer exert an influence wholly unfelt in the deep ocean.

The observations on the temperature of this sea have been too few to furnish a basis for any but the most general reasoning.

From Helgoland to Aberdeen the surface temperature registered by the *Drache*, fell continually from 51°.8 to 48°.6 Fahrenheit. At 8 fathoms there was a change of only .4, but at 16 fathoms the range was from 49°.8 to 44°.8.

Generally the water was warmer on the German side and on the Dogger Bank than off the Scottish coast. Six soundings between Aberdeen and Lerwick showed a steady increase in temperature towards the N. This increase was most apparent on the bottom of the sea, here 50 fathoms deep.

Seven soundings were made from Lerwick to the coast of Norway. The temperature at the surface and

for 8 fathoms below was 50°. Proceeding to the eastward it was found that colder water rose near to the surface; and the temperature at the bottom, 48½ fathoms, up to the edge of the great Norwegian gully, fell from 46°.4 to 45°.5. On the other side of the edge and in the gully at 48½ fathoms the temperature was above 46°.5. It fell gradually with increasing depth and marked 44°.8 at 147 fathoms.

Eleven soundings were taken in the last section, from Kors Fjord, down the deep trough, across the Skagerrack and along the Jutland coast to Helgoland.

Here there was an extraordinary increase, the surface being at 56° to 59°, and water warmer than 50° reaching down to 20 fathoms. In the deep part 46°.5 was marked at 25 fathoms, and 44°.6 to 44°.2 at the bottom. At 28-fathom soundings the bottom water was at 48°.2, and by the time Helgoland was reached it had risen to 58°.8.

The salinity of the sea was tested for the surface, for 16 fathoms below, and for the bottom. The mean salinity for the ocean water is 3.50 per cent. In the North Sea a small area to the N. of Orkney shows surface water with 3.55 per cent. of salt. Surface water of 3.50 salinity occupies the centre of the sea, N. of the Dogger Bank, close to the coast of Scotland, except between Berwick and Peterhead, but not approaching the E. side. In the S. there is between Yarmouth and Texel a patch of the same high percentage. South of a line from the south end of the Dogger Bank to the N. of Denmark, the surface water shows 3.45, while the rest of the sea shows a lower salinity, and the Continental side is much fresher than the British.

At 16 fathoms the 3.55 and 3.50 lines have the same

general direction as at the surface but enclose a greater area, the 3.50 line reaching the middle of the Dogger Bank and running up the Skagerrack. All the rest, except the salt streak from the Channel, is fresher, and freshens towards the shore.

At the bottom, water of 3.55 salinity comes in between Orkney and Shetland and spreads out along the coast of Norway. The 3.50 line curves away from the Scottish coast, as at the other levels, and the southern boundary of this salinity for the bottom is the same as that for the 16 fathoms; a great part of the sea towards the south not exceeding this depth.

Dr. Mill thinks it probable that the tidal effects in the North Sea are produced by a combination of a stationary east-and-west wave with a progressive wave; and he gives this general description of the phenomena:

"The great Atlantic tide-wave, advancing from the west, divides at the Shetland Islands, one tide-wave enters the North Sea from the N. W., the other passes over to the Norwegian coast, where it is reflected, and moving S. W. from about Kors Fjord, meets the direct branch, and with it gives rise to a series of east and west cotidal lines of simultaneous high water. In latitude 54°, between Flamborough Head and Helgoland, the tidal current runs alternately eastward and westward, the period of high water at each end of the range being six hours apart."

It has been proved that the tide through the Strait of Dover has no appreciable effect in the North Sea.

The Adirondack and State Land Surveys.—The latest Report of the Superintendent, Mr. Verplanck

Colvin, (for 1885,) gives a sketch of the work of these surveys from their beginning in a private enterprise of his own in 1865. He had found in his examination of certain wild districts of the State that the old maps in the office of the State Engineer abounded in errors, mostly due to the local attraction of magnetic iron ores; and he made yearly explorations at his own expense during the period 1866–1871. In 1870 he made several ascents and measurements of Mt. Seward, which was found to be but 4,400 feet high, instead of 5,100; and it occurred to him that many other recorded elevations might be erroneous. This proved to be the case, and it was plain that an accurate survey could only be made by a triangulation developed from precisely measured base-lines located on the cleared plains at the margin of the wild region.

Application was made to the Legislature, which voted an appropriation for the survey.

During the first year's work, in 1872, the highest source of the Hudson River was discovered in Lake Tear-of-the-Clouds, near Mt. Marcy, at a height of 4,351 feet above the sea; and the dividing line between the head-waters of the Hudson and the St. Lawrence was traced and mapped.

The survey has accurately determined thousands of positions and, in this way, rectified numberless boundary lines and recovered disputed lands. About one half of the region has now been covered by the trigonometrical measurement, and the topographical sketching is well advanced.

The counties included in the State Land Survey are: Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, and Warren, covering an area of nearly 15,000 square miles in Northern New York.

The lands belonging to the State in these ten counties amount to 750,000 acres. They contain nearly all the forest territory remaining in possession of the State, and also, it is believed, valuable mineral deposits.

Much of this region is unsuited to agricultural pursuits. Mr. Colvin says: "Between 1,500 and 2,000 feet above the sea frosts are not uncommon in summer, and I have known the entire crop of Indian corn in one of the most fertile valleys, having an elevation of only 900 feet above the sea, destroyed by frost in a single night early in August. Oats, however, and other hardy cereals can be profitably grown upon lands reaching an elevation of 2,000 feet above the sea, and potatoes will thrive wherever there is soil to cover them. Sheep and hardy cattle may be raised on the lowlands, but the hay crop is insufficient for the long and tedious winters."

Much of the region, he concludes, must remain a forest, and its value to the State can hardly be overestimated, when it is remembered that here are the sources of the Hudson, the Mohawk, and many smaller streams.

The rainfall of this region has been systematically observed for a period of four or five years, and the Report gives a table of the records kept at the stations, besides observations of the temperature at three of them. At Keene Valley, Essex Co., the rainfall was: for 1879, 28.38 in.; for 1880, 32.12 in.; for 1881, 30.63 in.; for 1882, 27.62 in.; and for 1883, 29.10 in.

At Edmund's Ponds, Essex Co., the figures were: for 1879, 42.68 in.; for 1880, 48.31 in.; for 1881, 46.07 in.; for 1882, 41.21 in.; and for 1883, 43.80 in.

At Elizabethtown, Essex Co., the record was: for

1879, 17.91 in.; for 1880, 29.55 in.; for 1881, 26.69 in.; and for 1882, 22.84 in.

The Adirondack Mountains lie almost wholly within Essex County.

At Pottersville, Warren Co., the rainfall was: for 1879, 28.34 in.; for 1880, 25.21 in.; for 1881, 26.18 in.; and for 1882, 20.03 in.

At Plattsburgh, Clinton Co., the record was: for 1880, 23.61 in.; for 1881, 21.59 in.; for 1882, 25.28 in.; and for 1883, 24.05 in.

At Clinton Prison, Clinton Co., the rainfall was: for 1880, 44.67 in.; for 1881, 50.81 in.; for 1882, 41.89 in.; and for 1883, 50.68 in.

These figures indicate an increase of precipitation with the altitude, Edmund's Ponds, in Essex Co., being 1,000 feet higher than Keene Valley, in the same county, and Clinton Prison 1,200 feet above Plattsburgh. It is noted, also, that storms are frequent in the vicinity of Clinton Prison.

Mr. Colvin gives for comparison the observations made in past years at Plattsburgh Academy. For 1847 the rainfall was 47.26 in.; for 1848, 32.00 in.; and for 1849, 35.02 in.; a mean for the three years of 38.09, while the mean for 1881, 1882, and 1883 is 23.64.

In the interval between these periods a great portion of the forest in Clinton and the adjacent counties was cut away.

The mean temperatures registered at Keene Valley were: for 1879, 40°.66; for 1880, 41°.69; for 1881, 41°.93; for 1882, 40°.54; and for 1883, 39°.36. The lowest recorded monthly temperature was for January, 1881, 10°.52, and the highest, 64°.07, in July of the same year.

At Plattsburgh the mean temperature for 1880 was 44°.76; for 1882, 43°.66; and for 1883, 41°.19. The lowest record was for January, 1883, 11°.99, and the highest, 69°.92, for July, 1880.

At Clinton Prison the mean for 1880 was 44°.29; for 1881, 42°.81; for 1882, 43°.88; and for 1883, 42°.65. The lowest monthly mean was 16°.12, for January, 1881, and the highest, 67°.90, for July, 1880.

At each of these stations January was almost invariably the coldest, and July the hottest, month of the year.

Area and Population of Europe. — The London *Times*, of Aug. 24th, publishes as the work of Gen. Strelbitski some curious figures concerning Europe. According to these the area of that continent is 6,233,060 square miles; only 2,409,677 more than Behm and Wagner allow. The Russian Empire in Europe alone, it seems, covers more than half of the whole continent, embracing the kingdom of Poland, the grand duchy of Finland, and part of the Caucasus. There can be no valid reason why Poland and Finland and part of the Caucasus should not be embraced by the Russian Empire, if that is what the *Times* would say, or by the whole continent, to which they belong. Embracing is not by any means the least innocent recreation in the world.

Unlike some political economists, the *Times* is quite as generous to its own people as to foreign nations, and, with the *Statesman's Year-Book* open before it, makes the United Kingdom larger than it is by 75,783 square miles.

With these liberal views on the land question there is combined a surprising respect for facts on the subject of

population, except in the case of Switzerland, which is credited in the *Times* office with 5,000,000 inhabitants more than it possesses, unfortunately for the world.

It is not easy to understand the measurements given, for, whether read as miles, or as versts, or as kilomètres, they are irreconcilably at war with the facts; and it is mere wantonness to print a hotchpotch of the kind under the name of Gen. Strelbitski.

A Good Example.—The Council of the Buenos Aires *Instituto Geográfico Argentino* unanimously adopted, on the 17th of June, 1887, the following Resolution:

"Hereafter no explorer, aided by the funds or supported by the influence of this Institute, will be allowed to bestow upon any spot the name of a person holding an official position in the Republic."

Tristan da Cunha.—The *Gazette Géographique* has recently published a number of communications on the subject of these islands and the orthography of the name by which they are known. Many of the gazetteers and maps give the incorrect form *d'Acunha*, and this tends, like most errors, to perpetuate itself.

The islands were discovered in 1506 by the Portuguese navigator, Tristão da Cunha, and received their name in consequence. This name is now applied only to the largest island, the other two being called, respectively, Inaccessible Island and Nightingale Island. The story of the discovery is told by Barros in the *Da Asia*, Dec. II., Liv. 1, Cap. 1:

"E quando veio ao atravessar aquelle grande golfão, que jaz entre esta terra e a do Cabo de Boa Esperança

metteo-se em tanta altura da parte do Sul, por lhe ficar dobrado, que começáram alguns homens pobres de roupa de lhe morrer e a gente do mar andava tão regalada (regelada), que não podiam marear as vélas; na qual travessa descubrio humas Ilhas, que ora se chamam do nome de Tristão da Cunha."

"And when he came to cross that great ocean which lies between this land (Brazil) and that of the Cape of Good Hope, he sailed so far into high southern latitudes in order to double the Cape, that some of his men, who were thinly clad, began to die off, and the seamen were so benumbed with cold that they could not handle the sails; and it was in this voyage that he discovered certain islands, which are now called by the name of Tristan da Cunha."

In Dec. IV., Liv. III., Cap. I., which describes the voyage of Nuno da Cunha to India, there is the following passage:

"Com bom tempo chegou em poucos dias ás Ilhas, que se chamam do nome de seu pai Tristão da Cunha, por as elle descubrir quando foi á India (como já dissemos) . . ."

"With good weather he arrived in a few days at the islands, which are called by the name of his father, Tristan da Cunha, because he discovered them when he went to India (as we have already said) . . ."

And Camoens (*Os Lusiadas*, Cant. X., Est. 39), not having before his mind the dread of the foreigner's reckless spelling, predicts the lasting fame of the navigator:

"Pelo Cunha tambem; que nunca extinto
Será seu nome em todo o mar, que lava
As ilhas do Austro, e praias, que se chamam
De São Lourenço . . ."

"By Cunha likewise; and never shall his name be forgotten in all the sea that bathes the islands of the south and shores, that are called of San Lorenzo."

It was Tristan da Cunha who first surveyed the East African coast as far as Cape Gardafui, the island of Socotra, and the shores of Madagascar (San Lorenzo).

Ocean Currents Contiguous to the Coast of California.—In the Bulletin of the California Academy of Sciences for June, 1887, Dr. C. M. Richter has an interesting study of the ocean currents on the California coast, from the recorded observations with the thermometer. At Trinidad Head, a little N. of 41° N. Lat., the temperature of the surface water 10 miles off shore is 48°.5; at 220 miles from the shore it is 54°.8. At San Diego the surface water 10 miles off shore has a temperature of 59°.8, and at 220 miles from shore, one of 59°.6. The surface temperature of Trinidad Head at ten miles from shore is found at a depth of 100 fathoms, 10 miles from San Diego. At 50 miles out to sea the surface temperature of 50°.2 off Trinidad Head agrees with that found off San Diego at 200 fathoms.

The average depth of the ocean 50 miles from the shore is 1,000 fathoms. At this distance a submarine mountainous grade, highest on the latitude of Point Carmel, about 36° N. Lat., alters the isothermal lines of the ocean. Another grade tending S. to San Diego has a similar effect on the temperature of the water.

All the isothermal lines 50 miles off shore show generally a constant increase towards San Diego. One hundred miles off shore the same regularity is observed, and at 220 miles the lines show a slow but constant increase, mainly of surface temperature, towards San Diego.

Off San Diego the temperature of the surface water is highest nearest the shore; the case is reversed off Trinidad Head.

A cold-water current of 45° to 50° in winter, 150 miles wide, exists on the northern boundary line of California, passing southward near the coast, and narrowing as it advances till it reaches Point Conception, where it is partly deflected to the S. W., and partly buried by warmer waters.

West and south of this cold current is a great body of water with a winter temperature of 55° to 60°, and with a southerly direction in the N. of California.

Dr. Richter concludes, from Commander Belknap's observations on the temperature of the Pacific, that the Arctic currents are strong enough to alter the direction of the Kuro Siwo, or Japanese warm current, and that while this trends eastward it perhaps nowhere washes the shores of the United States, because it is separated from them, to all appearances, by the narrow cold stream. At the same time the Kuro Siwo is near enough to the coast to influence the climate. What is called the eddy current, running N. along the California coast, is, in Dr. Richter's opinion, a still unknown scientific quantity. He is inclined to think that this current may be accounted for in a great measure by the influence of the prevailing winds and the trend of the coast.

The paper is admirably illustrated by eight tinted profiles of the ocean and the coast.

The Stanley Expedition.—*Le Mouvement Géographique* of August 28th, gives a summary of the tidings received from Stanley up to June 20th. Leaving Cairo on

the 6th and Zanzibar on the 23d of last February, the expedition arrived at Banana on the 18th of March, at Matada on the the 21st of the same month, and at Leopoldville on the 20th of April. On the 1st of May the whole force of 612 men left Stanley Pool. Accidents to the *Peace* and the *Stanley* caused some delay at Bolobo, where an entrenched camp was established, with a force of 125 men to hold it.

Leaving Bolobo with 640 men, Stanley reached Bangalla on the 30th of May. This portion of the trip was entirely pleasant; the natives were friendly, and provisions were obtained in abundance. At Bangalla the expedition separated, Tippoo Tip going on to the Falls, while Stanley followed the route by the Congo and the Aruwimi.

On the 18th of June he arrived at Yambuya. In his letter to Sir Francis de Winton he says: "We captured Yambuya with our steam whistles. We had wasted three hours in palavering with the natives, who began to look ugly at last, and to brandish their spears and shields. The scream of the steam whistle put them to flight. Next morning we found the village deserted. On all sides there are little villages composed of huts with roofs like extinguishers, and behind these there are broad savannas. Our scouts captured some of the natives, whom we dismissed with presents."

An entrenched camp was immediately constructed. Here Maj. Barttelot was to be left in command of 130 men, while Stanley, with 4 Europeans and 468 natives and Zanzibaris, set out on his march to Wadelai.

On the 19th of June he wrote to a friend at Brussels: "Every thing goes well. I expect to start in a few days, and to reach Emin about the 15th of August."

XUM

THE REPUBLIC OF COUNANI.—Since the disappearance of Orélie the First, king of Araucania, there has been no dignitary, at once so solemn and so shadowy as M. Jules Gros, President for life of the Republic of Counani. This republic is somewhere between French Guiana and Brazil. A Counanian never knows whether he is in his native land, or out of it, for the republic covers something between 24,000 and 175,000 square miles. There is, in either case, room for all, the whole population being 700. The capital, Counani, contains 350 persons, 35 houses, and the plan of a presidential palace. There is an order of the Star of Counani of which Mr. Gros is Grand Master, the Grand Crosses and Knights being the rest of the population. Two lines of vessels have been established, one to Cayenne, the other to Pará, and these will enable the republic to secure a monopoly of the chores in both places.

Mr. Gros ought to be proud that he has compelled the Brazilian minister in Paris and the French minister for foreign affairs to talk about him, and to send an official note to the *Temps*, warning off the millions who are eager to become Counanian stars.

AN EGYPTIAN IN THE HEDJAZ.—Mohamed Sadik Pasha writes, in the *Bulletin* of the Khedivial Geographical Society, an account of his journey to Mecca in 1885, as agent of the treasury, specially appointed to accompany the *Mahmel*, or covered litter, sent every year with the sacred carpet which is manufactured at Cairo for draping the Kaaba. This carpet is composed of eight pieces of black silk (two for each side of the Kaaba), and two curtains, one for the inner and one for the outer door, besides a carpet and a curtain for the mausoleum of Abra-

ham, which faces the Kaaba. A stone enclosed in the mausoleum bears what are supposed to be the footprints of the patriarch. The carpet costs 4,500 Egyptian pounds ($22,500), and the appropriation for the journey amounts to 11,700 E. P.

The mission left Cairo on the 3d Sept. by railway for Suez, and there took the steamer for Jiddah. The crowd of pilgrims was so great that the fare was reduced to 7 francs; but the steamers charged 75 francs for the return voyage. Jiddah was reached in three days from Suez.

The houses of Jiddah, 2,000 in number, are built of stone and are from 2 to 5 stories in height. Outside of the city wall is the Turkish military station, and near this stands the tomb of Eve, who must have been a remarkable person to look at, for the tomb is 492 feet long and 13 wide.

Jiddah contains about 20,000 people, fifty of them Europeans. The water supply is drawn from cisterns, and the city is far from healthy, fever prevailing the whole winter. There is some trade in grain and silks, but the principal business is the slave-trade.

Mecca, which is distant 33 hours by camel and ten and a half by ass travel, was reached in two stages of night march from Jiddah.

The mosque, with the arcades around it, is 630 feet long and 433 broad. The gallery formed by the arcades is a little over 60 feet wide. The Kaaba, placed almost in the centre of the mosque, is a nearly square chamber, 33 feet by 39, with a single door, the sill of which is between 6 and 7 feet from the floor.

Mecca stands in a valley surrounded by mountains. A man can go from one end of the city to the other on foot in forty minutes.

XUM

There is no business but that caused by the presence of the pilgrims, and the trade in the water of the well Zem-Zem, the sacred spring near the Kaaba. Provisions are imported. Eighteen hours to the S. E. is the little village of Taïf, famous for its soft climate and fruits and gardens. Here the rich people of Mecca pass the summer. In the village there are two stones which the Arabs adored, before the coming of Islam, under the names of the god *Lat* and the god *Izza*.

Among these people the women go with their faces uncovered. Marriages are arranged by the simple decision of a relative of the woman. There is no contract made before a sheik, and no mention of dowry.

In going to Arafat, which is six hours S. W. of Mecca, the whole body of the pilgrims, with the two Mahmels, the Syrian and the Egyptian, halted at Gebel-el-Rahma (the Hill of Compassion) an hour and a half before the setting of the sun. The multitude, gathered behind the two Mahmels, cried with a loud voice, praying for the benediction and the mercy of God, the All-Powerful, the Only, the Creator of the Universe.

When the sun had set, the prayer ceased. Then numberless torches were lighted, and the procession headed by musicians and by the two Mahmels, set out towards Mozdalifa, which is two hours and twenty minutes from Mt. Arafat. The pilgrim who fails to be present at Arafat on this occasion, or for some hours in the night following, has made his pilgrimage in vain.

At break of day the next morning, having joined in the morning prayer and listened to the sermon on the first day of the great Baïram (Feast of Sacrifice), the pilgrims moved to Mona, at two hours' distance. There, besides

the sacrifice of the great Baïram, each pilgrim made, according to his means, his offering of sheep or camels. Three days were spent at Mona in religious exercises, notwithstanding the excessive heat and the evil smell from the bodies of the animals that had been sacrificed.

The caravan then returned to Mecca, where the Mahmel was taken from the back of the camel before the door of the mosque and carried into the interior.

The heat during this journey was very great. On the Red Sea the thermometer marked from 89° to 95° Fahr.; at Jiddah it stood at 98°; and half way on the road to Mecca it reached 108°.

There are stationed at Mecca and in the neighborhood five regiments of Turkish infantry and three of cavalry; and at Medina one cavalry regiment, with three regiments of infantry. There are besides in the Hedjaz two artillery regiments; and six war ships cruise on the Red Sea between Bab-el-Mandeb and Yambo. The boundaries of the Hedjaz are: on the S. Assir, the plain of Nejd on the E., Syria on the N., and on the W. the Red Sea. The area is about 450,000 square miles. The revenue amounts to 1,533,933 Turkish piastres ($76,700), and the expenditures to 15,518,904 Turkish piastres ($775,945).

The inhabitants number about 700,000, divided into a great number of tribes, that of Saharie, with 30,000 souls, being the largest. To this tribe and nine or ten others of the Beni-Harbé the Turkish and Egyptian governments make annual distributions of corn and money.

Some of the tribes dwell in cabins, and possess cultivated grounds and date-trees. Others live in tents, and depend upon their flocks. All are Mussulmans, though

some have modified their faith and their practices. The tribe of Abu-Debaâ, which claims descent from Zeïd, grandson of Ali, allows the marriage of two sisters to the same man, and the remarriage of a divorced woman the same day, without waiting the three months and ten days prescribed by the Mussulman law. The Bedouin of this tribe bury their dead with bread, water, and two sticks. They practise brigandage, and anarchy prevails among them, though they listen with respect to the counsel of the aged. They do not marry with other tribes. The men alone drink coffee and smoke, and their women are kept apart. Their food is dates, with butter, and meat, with honey. Bread is very rare among them, and they have neither cattle nor buffaloes, and their meat is of camels and sheep. They have very little poultry, and they make no use of vegetables, which, they say, enfeeble the body.

The Source of the Orinoco.—The Paris Geographical Society publishes, in its *Compte Rendu*, No. 9, for 1887, extracts from two letters, one of March 19th, the other of March 25th, written by M. Chaffanjon from Ciudad Bolívar, Venezuela.

In one of these letters M. Chaffanjon says: "I returned on the 10th of March from the sources of the Orinoco. I was lucky enough to reach the sources of the river, and to give serious study to the communication of the Amazon with the Orinoco through the Cassiquiari. I send with this to the ministry a report on the description of the Upper Orinoco and the discovery of the sources. I send, moreover, nearly a hundred astronomical observations which will furnish the means of laying down

exactly the course of the river, a series of eighty words of various Indian tongues, and the tracing of my map of the Orinoco from the mouth of the Meta to the source of the river."

Here are surely sources enough, even for the Orinoco, and there should be left no doubt as to the discovery.

There is, nevertheless, room for doubt. Count Stradelli, another explorer, writes from Carácas, on the 27th of March: "One thing disturbs me: the news received within the last few days that the sources of the Orinoco have been discovered by a Frenchman, M. Chaffanjon, lately returned to Ciudad Bolívar. . . . I confess that this would annoy me not a little; but, if the thing is true, I shall have to be resigned. . . . If I am not to be the first, I shall be the second; and—patience!"

On the 29th he writes: "I have read the original letter in which Chaffanjon announces his discovery. And now that I have read it, do you want to know plainly my real conviction? It is that he has done just what Diaz de la Fuentes (?) did. He has gone as far as the Guaharibos (the famous rapids), and has turned back without passing one step beyond what had been discovered more than a hundred years before."

In a third letter, dated at Ciudad Bolívar on the 4th of April, Count Stradelli says:

"In a few moments I shall leave Ciudad Bolívar for the Upper Orinoco. . . . The sources, moreover, are yet intact. I have made the acquaintance of Chaffanjon, who is still here, have seen his map and heard his story, and it is just as I have already told you. He did not go beyond the point reached by Diaz de la Fuentes."

These letters are given in the *Bollettino* of the Italian Geographical Society for July.

M. Chaffanjon's second letter, already mentioned, is addressed to M. de Lesseps, as President of the Paris Geographical Society.

In this letter the French traveller tells M. de Lesseps that the sources of the Orinoco are enclosed by a chain of mountains in the form of a fan, and that he, as the discoverer, has bestowed upon this chain the name, not so brief as it might have been, of the "Ferdinand de Lesseps Mountains."

The multiplying of names is a thing to be deprecated and even, in certain cases, to be opposed, and there is no reason why M. Chaffanjon's range should not continue to be known as the Sierra Parima.

TIDES OF THE MEDITERRANEAN.—Mr. L. Haschert brings together, in the *Deutsche Rundschau für Geographie und Statistik* for July, the results of observations on the ebb and flow of the *tideless sea*, so called even to this day in school geographies, as well as in poetry. There are true tides in the Mediterranean, as there are in the Atlantic and in the Channel.

Along the coast of the Alpes Maritimes the mean difference between high water and low is from 6 to 8 inches. The least rise is about 4 inches at the first and the last quarter of the moon, while the highest does not exceed 10 inches.

There are three places in the Sea where the rise and fall of the tide are much more strongly marked than elsewhere. These are: the entrance to the Bay of Gibraltar, the Upper Adriatic, and the Gulf of Gabes near Sfax. At Gibraltar the tide rises from 5 feet to 6 feet 6 inches.

There is nothing like this in the Adriatic, where the

height of the tide increases gradually towards the upper end. At Brindisi the rise is 8 inches, at Ancona 1 foot 4 inches, at Venice 1 foot 8 inches, and at Trieste 2 feet 4 inches. The Adriatic displays, on a smaller scale, the same phenomena as the Bay of Fundy, where the waters are accumulated and pressed upward by the inflow. The same causes produce similar effects in the Gulf of Gabes, between Karkenah Bank and the Island of Djerba, where the tide rises to 5 feet, and even, at times, to 5 feet 6 inches.

There are many as yet unexplained anomalies in the movements of the Mediterranean waters. At Fiume the tide flows and ebbs but once in twenty-four hours, and the time of flood does not change with the passage of the moon across the meridian. It remains the same for weeks together, and advances on the average only two hours in the month, so that it takes a whole year to return to the same hour of the day. At Negropont, at certain stages of the moon, the tide ebbs and flows fourteen times in twenty-four hours. These anomalies must be largely due to the topographical conditions. Even on the coast of the Alpes Maritimes, where the rise is so slight, there are in winter occasional much higher tides, which cannot be wholly referred to the attraction of the sun and the moon. The atmospheric pressure and the influence of the wind, especially the former, must be taken into account. With the rise of the barometer the water falls, sometimes a fourth lower than at ebb tide, and observations at Nice, Cannes, Monaco, and other points, show that the level of the sea may be lowered by this cause alone as much as 1 foot 8 inches.

Another interesting fact is that the tides depend on the sun's attraction, the influence of the sun-wave, which is

elsewhere blended with that of the moon-wave, being clearly distinguishable in the western Mediterranean. The sea-wind which begins to blow at about 8 A.M., and dies away at sunset, impels the waters towards the shore. Logically this should make the level of the sea higher at mid-day than at 8 o'clock in the morning. The exact contrary is the case, not only at Nice, but along the whole coast from Cette to Leghorn.

The force of the wind in storms has a remarkable effect on the sea-level. On Christmas Day, 1870, during a great storm at Cette, the sea rose 3 feet 7 inches above the mean level, and at Trieste, on the 14th of October, 1875, a gale produced a rise of 6 feet 6 inches above mean low water. The engineers at Venice reckon a possible difference of level of 9 feet 10 inches between the highest rise and the lowest fall.

Among the modifying causes of the feeble and seemingly arbitrary tides of the Mediterranean are the eastern and western direction of the sea, the form of the coasts, with the interposed peninsulas and islands, and, most important of all, the nearly complete separation from the ocean.

Pioneers of Western Civilization.—Messrs. Bonvalot and Capus, who have been doing for two years past, with great energy, a work of exploration in Central Asia, reached India at the beginning of September, after many hardships in crossing the Pamir. They started on the 19th March, so that they were nearly six months on the way, struggling through snows, losing the road, arrested frequently and detained, and often in danger of starvation. The details of these and other adventures, when told in a connected form, will be extremely interesting. Mean-

while M. Bonvalot has written to the *Journal des Débats* (as reported in the London *Times*) a charmingly frank letter. He says that thirteen days after starting on the journey he and his companions reached a Chinese post. They asked their way, but were told that they must go back, the officer in command declaring that he would be put to death if he allowed them to pass without an order from Kashgar. Messrs. Bonvalot and Capus put their heads together and determined to defy the Chinese authority; and they did it in this way. They invited the chief officer to drink tea with them, and when they had him fairly in their power, M. Bonvalot, "without regarding the laws of hospitality," thrashed him with a stick and threatened to cut off his ears if he did not supply them immediately with camels. If all this be true, M. Bonvalot must be a remarkable person, destitute of regard for several things besides the laws of hospitality.

It is more than possible, however,—for the name of Kashgar is suggestive,—that the whole story is an Arabian Nights' tale, and it would be a satisfaction to read the Chinese officer's version of the affair, if there was any.

The Parts of the World.—According to the *Gazette Géographique*, Mr. E. Hansen Blangsted is said to have expressed the opinion that the accepted division of the world into five parts does not state the facts of the case. What is to be done with the Polar Region?

The remark is just, but is there not a doubt as to what is meant by *the* Polar Region?

Admitting that there are two poles and a region for each, there is still left an uncertainty as to further subdivisions, and the gain in any case does not seem to be equal to the outlay.

Giacomo Bove.—This distinguished Italian traveller, who, at the age of thirty-five years, had already won an honorable name among the explorers of the present day, died by his own hand at Verona on the 9th August, 1887. His last expedition was to the Congo, from which he returned with broken health, and, it is believed, with the germs of the malady that brought on his untimely end.

It was, possibly, ill-health that made him take his gloomy views of the Central African region. "The Lower Congo," he wrote, "is in no sense a fine country. When I left Italy I thought very differently of the great African river. I had read about it, and I knew, indeed, that the vegetation was not rich, that the banks were thinly peopled, and that the animal life was but limited; yet I never could have believed that the plant life was so poor, and the population so scanty, and the whole nature so nearly dead."

Signor Cucca, in the *Bollettino* of the *Società Africana*, implies that Bove's career was in a sense a failure, even to himself; but it is not easy to make the public responsible for such failures, because it is equally ready to bestow exaggerated praise and unmerited blame, and Signor Cucca is much more nearly right when he adds that there is no exact measure for things. It is not possible that there should be, for, even with the best intentions, no one could give an exact account of his own career. The man must bear what comes to him. To the public he is but one of a countless multitude.

New Guinea Exploration.—*Nature*, of August 11th, quotes from the *Sydney Morning Herald* the report of Mr. Theodore Bevan's exploring expedition in New

Guinea in the early part of the year. Mr. Bevan, in the *Victory*, entered the Aird River, which proved to be but one of several mouths of a large river to which was given the name of the "Douglas."

This stream was ascended for 130 miles, through a country covered with forests.

A channel (marked on the Admiralty chart as dry land) led from the Douglas into Deception Bay. Near Bald Head, the eastern headland of the Gulf of Papua, was discovered another large river, opening into the gulf through six mouths. This river was ascended for 110 miles, in a general E. N. E. direction, though the stream was very winding. In one place it was nearly half a mile wide and flowed through a magnificent hill country, with towering blue mountain peaks in the distance. The hills were all clad with trees, and watercourses were seen glistening in the sun. This was thought by the discoverer to be the finest river in British New Guinea, and he did not shrink from bestowing upon it the name of the "Jubilee."

Seven tribes of natives were met with, all, except the first, friendly. The hostile tribe, encountered at about twenty miles from the mouth of the Aird, was put to flight by the steam whistle, the arm of which Stanley has made such good use. The largest of these tribes was the Kiwa Pori, which numbered 400 or 500 men; and, except along the coasts, the country seemed uninhabited.

The land at the head of the deltas and near the hills was rich, and the sago, banana, tobacco, bread-fruit, and sugar-cane were found to be indigenous.

The expedition secured about 80 birds, besides a few reptiles and fishes and a considerable ethnological collection. The temperature ranged from 72° at daybreak to 86° at noon.

The French Congo.—In the *Revue Coloniale Internationale* of Sept.–Oct., M. Ferdinand Galibert shows what has not been done to develop the French Congo, as well as certain other West African possessions of France. He relates that some young men set out from France for the African coast. They had to choose between a Liverpool and a Hamburg steamer. "We noticed," says one of the emigrants, "at the many stopping-places on the way, that there were foreign flags to be seen, but not the French." They reached the Gaboon—a French colony—after a month's voyage, and had to accept the hospitality of a Portuguese. The commerce of the Gaboon with Europe is maintained by four steamers a month, two English and two German, and from the Gambia to the Benguela almost the whole trade is carried on under these two flags, their only competitor being the Portuguese line of steamers. There is a lighthouse without a light at the Gaboon; a small matter when, according to the *Revue*, ships drawing 15 *metres* can enter the road at any time in daylight. Libreville, the chief place, is being absorbed by Glass, with its five important English and German houses. The return of imports and exports of the colony for 1884 is eloquent: France, 427,565 fr.; other nations, 8,834,931 fr. It was necessary to take the foreign steamer to reach the Ogowe. Here the most important point, Lambaréné, is 150 miles inland, and Mr. Galibert makes the reasonable reflection that the rich products of Africa come from a great distance, and that for their transport the labor of slaves will always be cheaper, so long as communications are open, than the least expensive European methods.

He finds that the English secured and long monopolized the trade of Western Africa by establishing factories and

agencies at points along the coast and regular monthly lines of vessels to keep them supplied; so that the English merchandise formed and developed the native demand.

The Germans have followed the English example and thrown upon the market, not German articles, but the articles the natives want, and at low prices.

The French must do the same thing, if they are to keep their place in West Africa. The greatest obstacle in their way is, M. Galibert shows, the government monopoly in certain products.

Powder, for instance, which is delivered on board ship at Hamburg for 1 fr. 10 per 3 lbs., costs in France 1.50; while, after paying duty at the Gaboon, the German article costs (with the advantage of the government premium of 20 centimes) 1 fr. 20, and the French, 1.62. Leaf tobacco costs at Hamburg 1 fr. 35 per kilogramme, and in France, 1 fr. 80, while the German can be delivered for consumption in the Gaboon for 33 centimes per kilogramme less than the French.

M. Galibert's facts seem to be undeniable, and his arguments, in the main, sound; but his conclusion, which throws the responsibility for the feeble development of French commerce in West Africa on the "ephemeral governments and not less ephemeral innovations," which succeed each other in France, is far from sound. The monopolies of powder and tobacco were not invented by the ephemeral governments, and monopolies of a similar character may be found in countries blessed with what are called permanent forms of rule and administration. A settled line of policy, if it is right, is preferable to an innovation, which is adopted merely because it is new; but M. Galibert does not appear to consider that, with

changing relations, there must often be a change of policy as well as of plan. There is not even yet a generally accepted definition of the word *colonization.*

The underlying purpose in the foundation of colonies at the present day is undoubtedly the expansion of trade, and this has always been the English purpose. The French colonies were planted on a different principle, and without the innovations and essays, of which M. Galibert complains, they cannot be modernized.

The Pearl Fishery in the Pacific.—In an article on the "Cruises of the German War-Ships in 1886," the *Deutsche Kolonialzeitung* gives, from a French report, some details of the pearl fishery in the Society Islands.

The naturalist, who made the report to the Minister of Marine, found that the pearl-oyster was threatened with destruction, and that by judicious management it might be saved.

Of the eighty islands comprising the Society group, there are but five or six that do not produce pearls. The best mother-of-pearl is supplied by Tahiti, where the oyster-banks run the greatest danger, because the whole population, including the women and children, is actively engaged in the fishery. The women are by no means the least skilful divers, and three of them are famous, in all the group, for their courage and dexterity.

The islanders dive to a depth of twenty-five fathoms, and even more, and can remain under water for three minutes at a time. They are in constant peril from the sharks, and their occupation is besides very hurtful to the health. They are careful, especially at the beginning of the season, not to go down too often in one day. The habit of diving develops disease of the lungs and other

internal organs, and it must be given up after a certain age, or it brings on paralysis.

Very few of the Tahitian pearl-fishers work for their own account, most of them being hired by the day at the rate of five francs. They begin work early in the morning after having assembled and listened with attention to a prayer, offered up by the most respected one of their number. The other preparations are soon made; the diver throws off his clothes and plunges in, taking only a glass with which he surveys his field of operations. With this glass, in the wonderfully clear water of the South Sea lagoons, he discovers the oysters at a very considerable depth.

The divers in the Indian Ocean and the Persian Gulf put on a dress, loaded so as to facilitate their sinking, and protect their eyes and ears and mouth, and make use of a line to aid them in rising to the surface; but they do not remain under the water so long nor dive to such great depth as the Tahitians. Though these are able to hold out for three minutes, the average stay at great depths is about one minute and a half.

Repeated efforts have been made to introduce the diving-apparatus, but without success, which is to be regretted, for three Europeans found that not only did its use increase the haul of oysters, but the sight of the diver dressed in it alarmed and chased away the sharks.

At the end of the day's labor the oysters are opened with knives in the presence of the owners, who watch the operation with the greatest vigilance, because the Tahitians, though they have no pockets, are amazingly quick in concealing the pearls about their persons, the moment they think themselves unobserved.

The fishery is prosecuted all through the year, but

particularly in November, December, January, and February. In June, July, and August, the winter of the Southern Hemisphere, the water is too cold in the early part of the day, and the divers go to their work in the afternoon.

MONUMENT TO PURDY PASHA.—The *Bulletin* of the Khedivial Geographical Society for June, 1887, publishes in full the proceedings of the Society at the dedication of the monument erected by the members in the American Cemetery at Old Cairo, to the memory of E. Sparrow Purdy.

The monument is in the form of a small Egyptian temple in gray granite, surmounted by an obelisk in Trieste stone. On this is sculptured in relief a palm with the name PURDY in letters of gold. The front of the temple bears the inscription:

TO
ERASTUS SPARROW PURDY
THE
KHEDIVIAL GEOGRAPHICAL SOCIETY
IN MEMORY
1884

At the other end are the words:

BORN IN THE STATE OF NEW YORK 1838
COLORADO EXPEDITION 1857
DARFUR AND HOJRAT-EN-NAHAS 1874–1876
DIED AT CAIRO JUNE 21 1881

These inscriptions are in French. Abbate Pasha, Vice-President of the Society, presented in a brief address the salient points of Gen. Purdy's career, and especially dwelt upon his geographical work in Darfur, which he conquered as an Egyptian officer and explored as a man of science.

He was followed by Col. Mohamed Moktar Bey, who gave expression to the sentiments of regard and affection with which he and his brother officers cherished the memory of Purdy.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

AMSTERDAM.—*Revue Coloniale Inernationale.*

* Canada and the Federation of the Empire—German Colonies and Protectorates in 1887—* The Poisonous Serpents of Deli (Sumatra)—Remarks on the Supply of Water in New Guinea and the Bismarck Archipelago—Map of the Ethnographic Relations of Asia and the Bordering Parts of Europe—In the Bismarck Archipelago: Neu Pommern—* Certain Resemblances in the Land Tenure and Criminal Law of the Kaffirs and Anglo-Saxons—The Chinese Railoads for the Future—French Colonies and Protectorates.

BERLIN.—*Deutsche Kolonialzeitung.*

The Brazilian Press and German Colonization in Brazil—The Legal Position of the Natives in the German Protectorates—The Back Country of Angra-Pequena and Walfisch Bay—Contributions to the Knowledge of the Brazilian Province of Paraná—From New Guinea—The Future of the Cameroon Country—The Tropical Climate of the Malay Islands and Its Influence on Europeans—Voyages of the German Fleet in 1886—Description and Hydrography of the East African Coast—German Cultivation and Settlement of Africa—The Asylum of Germany in the South Sea (Samoa)—The Question of Freedom of Worship in Brazil—The Prevention of Malaria—The Contract-System (in German Africa)—Natural Products of the Western Pacific—A German Colony in South Brazil—The Situation in Hereroland.

* Articles thus marked are in English.

BORDEAUX.—*Société de Géographie Commerciale, Bulletin.*

Pioneers of German Commerce and German Industry —Various Products of Tonkin — Geographical Results of the Seventh Campaign on the Upper Niger — The French Soudan — The Island of Réunion — The Soudan: Railway from Dakar to St. Louis—The Port of Dakar—Iceland and the Faroe Islands — The Bridges of Cubzac (on the Dordogne)—The Railroad through the Heaths of the Gironde.

BREMEN.—*Deutsche Geographische Blätter.*

L. Michaelis and the Oldest Maps of East Friesland —A Voyage to the Persian Gulf—Hainan—From the Republic of Liberia.

BRUSSELS.—*Société Royale Belge de Géographie, Bulletin.*

The Austrian Congo Expedition—British Columbia —The Commune of Bellecourt (14 miles N. W. of Charleroi).

Le Mouvement Géographique.

Emin Pasha's Reconnoissance of the Kakibbi River —Exploration of the Licouala—The Stanley Expedition — Geological Exploration of the Stanley Falls — Portuguese Congo — Von Schwerin's Travels from Banana to Boma—Map of the Congo Free State—Exploration of the Lopori—The Transasiatic Railroad—Situation in the Lower Congo Region—Capello and Ivens's African Journey — Railroads of the World—The Rapids of the Oubangi—Exploration of the Antarctic Regions—The Ptolemy of the *Bibliothèque de Bourgogne* at Brussels—The Stanley Expedition to the Help of Emin-Pasha

and of Casati—The Region of the Falls—Tides in the Scheldt and on the Belgian Coast.

BUDAPEST.—*Société Hongroise de Géographie.*

The United States of Colombia and the Isthmus of Panama—The Community in the Hungarian Alföld (Low-Country).

BUENOS AIRES.—*Instituto Geográfico Argentino, Boletin.*

Exploration of the Araguay-Guazú—The Province of Santa Fé and the Chaco.

CAIRO.—*Société Khédiviale de Géographie, Bulletin.*

Harrar under the Egyptian Administration—Cities and Tribes of the Hedjaz—The New Egyptian Coinage.

COPENHAGEN.—*Geografisk Tidskrift.*

The Northwest Peninsula of Iceland — Johann Meyer's Map of Helgoland.

EDINBURGH.—*The Scottish Geographical Magazine.*

Japan—Zemo-Kartli, or Upper Georgia—The Geology of the East Indian Archipelago — Dr. Junker's Travels in Central Africa — Recent Physical Research in the North Sea—Geography and Geology—The Monbuttu and their Country —Upper Burma during 1886—Mr. Fulford's Journeys in Manchuria—The Colorado River of the West—The Australian Alps—Geological History of Lake Lahontan—The Norwegian North Atlantic Expedition.

FLORENCE.—*Sezione Fiorentina della Società Africana d'Italia, Bullettino.*

The Physical Possibility of Colonizing Abyssinia—Dr. Traversi in Africa—The *Krempt* (Rainy Season) at Entotto (on the Abyssinian Tableland, 400 Miles S. W. of Assab).

GOTHA.—*Petermanns Mitteilungen.*

The Plant Zones of Japan—Mean Duration of the Warm Period in Different Localities in Europe—Travels in the Western Sudan—News of Emin-Pasha—Preliminary Report on the Expedition to Transcaspia and North Khorassan in 1886—Volumetric Calculation of Mountains by Means of Prismatoids—On the Statistics of Greenland—The Kina-Balu Lake in Borneo—Investigations in the Arabian Desert-Plateau of Middle Egypt—Relative Heights of the Mean Levels of the Seas on the European Coasts—Mining in Oriental Siberia, 1874–1885—Maps of the Lower Khuiseb Valley—Explorations in the Australian Alps.

HAVRE.—*Société de Géographie Commerciale, Bulletin.*

Tunisia—Bassorah and the Ports of the Persian Gulf.

LILLE.—*Société de Géographie, Bulletin.*

The French Sudan—Cold Climates and their Effects on Human Life—Three French Affluents of the Congo: the Alima, Licouala, and Sanga Rivers. The White Fathers (Algerian Missionaries).

LISBON.—*Sociedade de Geographia, Boletim.*

The Romanic or Neo-Latin Dialects in Africa, Asia, and America—Fauna of the *Lusiad*—First Documents for the History of the Camoens Jubilee in 1880.

LONDON.—*Nature.*

Atlantic Weather Charts—A Review of Lighthouse Work and Economy in the United Kingdom During the Past Fifty Years—The Eleven-Year Periodical Fluctuation of the Carnatic Rainfall

—Abstract of the Results of the Investigation of the Charleston Earthquake.

Proceedings of the Royal Geographical Society.

Explorations in Central Africa—Notes on a Part of the Western Frontier of British Honduras—Russian Geographical Work in 1886—On the Society's Expedition to the Namuli Hills, East Africa—A Journey through Yemen—Recent Changes in the Map of East Africa—Journeys in the District of Delagoa Bay, Dec. 1886–Jan. 1887—Expedition of Mr. George P. James from the Chanchamayo in Peru to the Atlantic—A Journey in Manchuria—The Aboriginal Indian Races of the State of Vera Cruz, Mexico—Indian Surveys, 1885–6.

LYONS.—*Société de Géographie, Bulletin.*

Latin America—The English Explorations in 1886.

MADRID.—*Revista de Geografía Comercial.*

English Possessions in Latin America—Plan of a Railroad System for the Island of Luzon—Chinese Immigrants Necessary to the Progress of the Philippines, and Measures that should be Adopted concerning them—Spanish Agriculture and Stock Raising, and their Market in England—Parliamentary Representation of the Philippines in the Cortes—Spanish Micronesia: the Mariana (Ladrones) Archipelago—Lines of the *Trasatlantica Española*—Reform of the Philippines—German Commerce and its Relations with Spain—Colonial History: British Honduras—Fernando Po.

MARSEILLES.—*Société de Géographie, Bulletin.*

The Useful Plants of Tropical Africa—The Foreign

Element in the United States—Armenia and the Armenians—The Earthquake of Feb. 23, 1887—A Cyclone in the Pacific.

MILAN.—*L'Esplorazione Commerciale.*

Notes on Morocco—Western Africa—Languages and Literature of the Present Peoples of Africa—The M'Bogo—Burma—Batum—Indian Teak—The New City of Barberton, Transvaal—New Zealand—The Agrarian Crisis—The Tonga Islands.

MUNICH.—*Jahresbericht der Geographischen Gesellschaft.*

The Old Rhine Glacier on the Outlier of the Alps—Cephalonia and Ithaca—Contributions to the Statistics of Bavaria.

NAPLES.—*Società Africana d' Italia, Bollettino.*

The Colonial Expansion and the Programme of Italy in Africa—The Inhabitants of Harrar—Through the Country of the Danakils—The Kalahari Desert.

NEW YORK.—*Science.*

The Exploration of Arctic America—The Charleston Earthquake—New Explorations in Central Africa—Topographical Survey of the United States—Junker's Travels in Central Africa—Prejevalsky's Journeys in Central Asia—The Geographical Movement in England.

PARIS.—*Société de Géographie Commerciale, Bulletin.*

Cost of Algeria and Tunisia—The Provinces Binh-Dinh and Phu-Yen, in Annam—Journey of Two Annamites to Somboe (Cambodia)—The Tonga Islands—The Island of Pines (40 miles S. of New Caledonia).

Société de Géographie, Compte Rendu.

M. Topinard's Circular on the Anthropology of

France—Reports on Geography in Russia, on the Name of Cape Comorin, on Algeria, on Tunisia, on Socotra — Excursion in the Moï Country (Tonkin)—Letter from M. Bonvalot—Letter from M. Krause in Western Africa—Note of M. Virlet d' Aoust on the Action of Oil on the Ocean Waves—The Egyptian Census—The Total Eclipse of August 19, 1887—The French Sudan.

Revue de Géographie.

The New Hebrides—The Discovery of Canada by the French—The Two Buache (Geographers of the 18th Century)—Distribution of Temperature on the Surface of the Globe—The German Colonies in Western Africa — Sequel to the Mémoire on Commerce Presented to the Minister of Marine in 1784—Progress of Geographical Science in Belgium.

Revue Géographique Internationale.

Port of Bizerta (Tunisia)—The Fisheries of Tonkin —Discovery of Christian IX's Land (Greenland) —The Mouths of the Son-Ca (Tonkin)—Diego Suarez Bay—Voyage to the Philippines—Industries of the Department *du Nord*—Capt. Baviera in the Western Sahara.

La Gazette Géographique.

The Opening of Exterior Indo-China—Commerce in Réunion and Mauritius—Our Empire in Northern Africa—A Channel through the Rapids of the Donnaï (Tonkin)—The Natural Frontier of the Alpes Maritimes (Department) — Pacification of Annam—The Polar Expedition of Bunge and Toll (from Irkutsk)—Dr. Junker's Travels

in Africa — Vasco de Gama — Elementary Instruction in Topography—The Problem of the Welle-Makua—Geographical Results of the 7th Campaign on the Upper River (Senegal)—The Stanley Expedition—The French Sudan—An Excursion in Western Siberia—The Canal between the North Sea and the Baltic—Dr. Schinz in S. W. Africa—Exploration of the Antarctic Regions—Navigation of the Upper Red River (Tonkin) — The German Expedition to the Congo—Baron von Schwerin (of the Swedish Congo Expedition) at Paris—Abyssinia and the Red Sea Coast—The New Hebrides Question in London—Jacques de Brazza on the Congo — Excavations in Egypt, 1885-1886—Management of the Artesian Well of Wady Rir' (Algerian Sahara)—The Da Cunha Islands —A Russian Traveller in English India—The Death of Stanley—Congress of French Geographical Societies.

Le Tour du Monde.

Explorations at Susa—Explorations in Lapland—A Vacation Voyage to La Plata.

Rio de Janeiro.—*Sociedade de Geographia, Revista.*

Boundary between Brazil and Venezuela—The River Xingú.

Rochefort.—*Société de Géographie, Bulletin.*

Cochin-Chinese Woods—The Falls of the Congo—Notes on Algeria.

Rome.—*Bollettino della Società Geografica Italiana.*

Progress of Geography in Recent Times: President's Address—On the Life of the Savage Tribes in

the Region of the Ogowé and the Congo—The Remains of the Traveller Miani—Charts Belonging to the Corsini of Florence—Antinori's Travels among the Bogos—Letters from Shoa—Expedition to the Sources of the Orinoco—What is Properly Meant by the Names of the Romagna and the Emilia?—The Prehistoric and Ethnographical Museum of Rome—From Entotto to Zuquala—The Island of Nias—In Search of the Italians in South Africa—A Journey to the Bogos Country—Giacomo Bove (Obituary).

ROUEN.—*Société Normande de Géographie.*

The Red River (Tonkin)—The Rhine Basin—The Normans in Iceland.

SAINT PETERSBURG.—*Bulletin of the Imp. Russian Geographical Society*, vol. xxiii., parts 1 and 2.

Outline of the Frontier Part of the Kars District—Preliminary Report on the Results of an Expedition for the Collection of Russian Popular Songs and Airs—Review of Rykatcheff's Breaking up and Closing of the Waters in the Russian Empire—Report of a Geographical and Botanical Exploration of the Eastern Thian-Shan Sands and Steppes in the Region of the Caspian—The Mountains of Khorassan and the Cultivated Strip along the Caspian—On Some New Tables for the Calculation of Altitudes by Barometrical Observations.

STUTTGART.—*Das Ausland.*

An Excursion to Szekzard—A Night in a Turkish Khan—Orissa, the Holy Land of the Hindu,

and a Pilgrimage to Jaggernath—The Sacred Dances of the Pawnees—Latest Letters from Emin-Pasha—Geological Relations of Banka—The *Revue Félibréenne*—The Sealskin and its Home—Lake of Neusiedl—From Russia's Farthest East — Cannibalism among the North American Indians—Exploration of the Ratzna Valley—The Kalmucks—The British Herring Fishery—The Höttinger Breccia in the Valley of the Inn—Geological Notes on Borneo—The Comoro Islands—Manners and Customs in the Island of Föhr (on the Coast of Friesland)—The Steppes of Southern and Middle Persia—Babylonia as a Field for Colonization—The New Hebrides Islands—On the Natural History of Volcanoes—Sketches of Sookhum-Kalé—Brigand Life in Andalusia—The Commercial and Political Significance of the Red Sea in Ancient and Modern Times—The West Coast of the Argolic Gulf—On the Border of Asia—The Goddess *Fortuna* of the Southern Slavs—The Western Boundary of Montenegro—Sketches from the Caspian Sea—Ten Kate's Travels in Guiana and Venezuela—A Banquet with King Ja-Ja—La Quaresima (Neapolitan Scenes)—Ascent of Cloudy Mountain in New Guinea.

TOULOUSE.—*Société de Géographie, Bulletin.*

Tonkin—Origin and Cause of Volcanoes and Earthquakes.

TOURS.—*Société de Géographie, Revue.*

Maurice de Tastes (Biographical Notice)—The Crossing of the Caucasus by the Military Road of

Darial—Notes on Goleah—Report to the VIII National Congress of French Geographical Societies.

TURIN.—*Cosmos.*

Ramon Lista's Travels in E. Patagonia in 1884—Total Eclipse of the Sun on the 19th Aug., 1887 — Exploration of the Orinoco and its Sources—Ethnology of the Egyptian Sudan.

VIENNA. — *Mittheilungen der K. K. Geographischen Gesellschaft.*

Emin-Pasha's Last Journey from Ladó to Monbuttu and Back—The Subterranean Watercourses of Carniola — The President's Annual Report—Present Point of View of Official Cartography in European States—Survey of the Results of the Danish Explorations in Greenland, 1885–1886.

Deutsche Rundschau für Geographie und Statistik.

The Seventh German Geographical Congress—Geological Sketches of Turan—Colonization of German S. W. Africa—Outlines of a Morphology of the Earth's Surface—The Advance of Geographical Discovery and Travel in 1886—On the Volga — Development of the Submarine Cables at the Close of 1886 — Chavanne's Travels on the Lower Congo.

WEIMAR.—*Zeitschrift für Wissenschaftliche Geographie.*

The South Polar Question and its Significance in Relation to the Development and Structure of the Earth's Surface—The Distribution of Temperature in the Ocean—Hauber's Attempt to Found a German Geographical Society, 1727–1730.

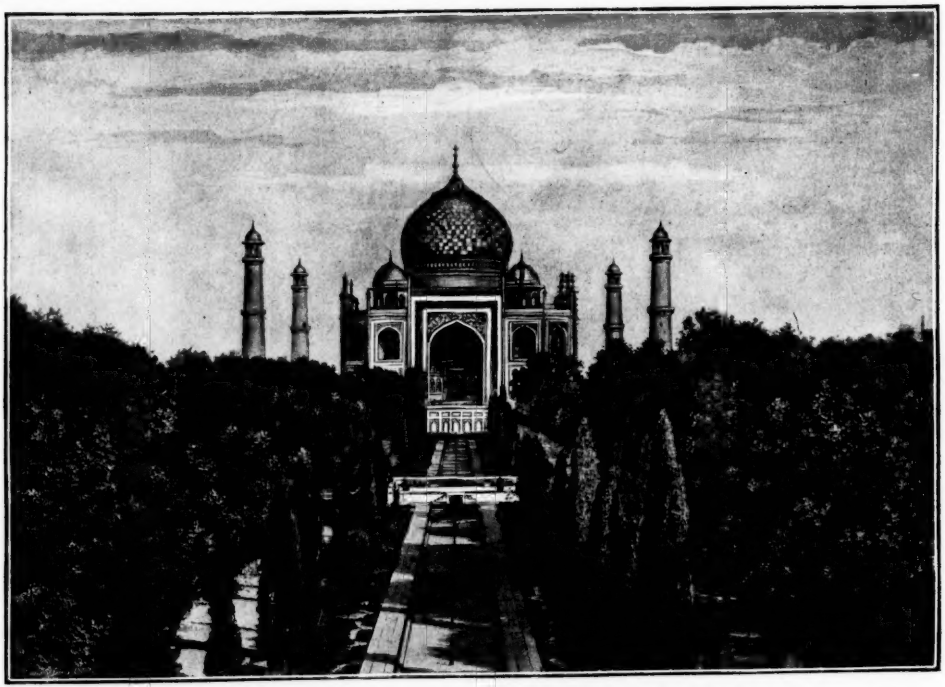
ROBERT LENOX KENNEDY.

BORN NOVEMBER 24, 1822.
DIED SEPTEMBER 14, 1887.

Mr. Kennedy died on the North German Lloyd steamship *Trave*, on his homeward voyage from a visit to Europe, undertaken for the benefit of his health.

He was a native of New York, and though in no sense a public man, was yet identified, as a public-spirited and high-minded citizen, with all its great concerns and with its social and charitable institutions. His interest in all these was active, and he gave freely of his means and his personal effort to every good cause.

He became a Fellow of the American Geographical Society in 1854, and a member of its Council in 1884, and for more than thirty years he brought to its service the resources of a literary taste and judgment uncommonly pure and sound, and a wide range of scholarship. Many valuable works now on the shelves of the library were secured through his means, and many more were contributions taken from his own well-chosen collection.



THE TAJ MAHAL.
(Agra).